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1661

George, Earl of Dartmouth, K.G. F.R. & A.S.

Late a Vice President of the Society

for the Encouragement of Arts, Manufactures and Commerce.

Engraved by Charles Warren, from a picture by Thomas Phillips, R.A.

in the possession of the present Earl.

16766

TRANSACTIONS

OF THE

SOCIETY,

INSTITUTED AT LONDON,

FOR THE

ENCOURAGEMENT

OF

ARTS, MANUFACTURES, AND COMMERCE;

WITH THE

PREMIUMS offered in the Year 1813.

VOL. XXXI.

LONDON:

PRINTED BY R. WILKS, CHANCERY-LANE.

Sold by the HOUSEKEEPER, at the SOCIETY'S HOUSE, in the Adelphi; and by Messrs. J. WHITE, BECKET, JOHNSON, CADELL and DAVIES, PHILLIPS, WALTER, RICHARDSON, LONGMAN and REES, NORMANVILLE and FELL, and TAYLOR.

[Price TEN SHILLINGS and SIXPENCE.]

MDCCCXIII.

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PREFACE.

THE Society have, in the present Volume, paid a tribute of respect to the memory of the late Earl of DARTMOUTH, by prefixing his Portrait, engraved by Charles Warren, Esq. from an original painting by Thomas Lawrence, Esq. R.A. in the possession of the present noble Earl.

His Lordship, when Lord Lewisham, became a Perpetual Member of the Society so long since as the year 1785; but, on being elected a Vice President, in the year 1807, he added to his life subscription a contribution of Five Guineas annually. His Lordship died in the course of last year.

The Class of Agriculture, as in the former Volumes of the Society's Transactions, takes the precedence in situation in the present, and will be found to contain many interesting communications, not only on the business of Plantations and Culture of Land, but also on the preservation and application of the articles produced.

Major Bryan Hesleden, whose exertions in draining a large morass were noticed in the last Volume, was, during

the last Session of the Society, rewarded with the Gold Medal for improving upwards of one hundred and seventy-seven acres of Waste Land, and has given some useful observations on the benefits arising from such improvements.

W. C. Knowlys, Esq. has displayed an active spirit in planting and bringing into cultivation three hundred and eight acres of Waste Land; and adopted a very useful plan for furnishing his land with manure from the public stables, built by him for the change of horses on the Brighton road.

The death of the late John Maurice Jones, Esq. who had commenced and was carrying on his Plantations in North Wales on a very extensive scale, appears to be a great public loss. We have some satisfaction, however, in understanding that his successor purposes to continue on a similar plan the same national benefits.

The Plantations of Patrick Steuart, Esq. in Scotland, are highly praise-worthy, and the great advantages arising from Larch Trees, not only from their timber, but also from the use of the bark in tanning, as confirmed by Mr. White's communication in this Volume, it is hoped will afford a considerable profit to the planter of this valuable tree.

The

The communication of John Whately, Esq. will be found of great consequence, as it furnishes the means of providing from potatoes, at very little expense, a Farina, or nutritious Diet, less liable to suffer by long keeping or the action of sea-water than other farinaceous matter; it ensures a certain profit to the farmer; it retains much nourishment in a small bulk, and ought always to form a part of the stores of the Army and Navy. It particularly deserves remark, that even frosted potatoes will yield a Farina, or flour, in abundance, and of good quality; and by such a preparation a large quantity of valuable food may be preserved from putrefaction. Mr. Whateley's machine for preparing it will be found applicable, with great benefit, to the extraction of cyder and perry from the apple and pear.

The attention of Mr. Leonard Phillipps, jun. to improve the natural Fruits of this country deserves much commendation; the indefatigable exertions which he makes to procure and disseminate the best kinds of each species, are worthy of notice, and when it is considered that a good fruit tree occupies no more space than a bad one, much public benefit appears likely to arise from his labours.

The observations we have before made upon the Larches planted by Patrick Steuart, Esq. equally apply to the

Plantations of Mr. William Backhouse, and Mr. Jonathan Backhouse, jun. which, we doubt not, will answer the purposes both of the planters and the Public.

To prevent the unnecessary waste of food, and to facilitate labour, are desirable objects. Mr. Green's implements for forming Sets from Potatoes answer this end completely; the regular form of the Sets made by them enables the Sets to be planted by a drill with great facility, and leaves a considerable quantity of the original potatoe in a state proper to feed hogs and cattle.

Mr. Edward Knight's Paper on growing Beans and sowing Wheat on the same land, the same year, shows how to prevent the usual custom of a fallow; to complete this object perfectly it is hoped that an early species of Beans will be discovered, agreeably to the Society's premium offered in page 5, Art. XXII.

The many useful purposes to which Wax and Honey can be applied, and the agreeable amusement afforded by the management of Bees, ought to be an inducement for the extension of apiaries. Mr. Knight's observations on preserving the weak swarms produced after the month of June, deserve attention.

In the Class of Chemistry the experiments and observations

ations made by Thomas White, Esq. on the application of Larch Bark to tanning Leather, form almost a new æra in this valuable art. We view this matter with particular satisfaction, whether we contemplate the public benefit arising from an article previously regarded as refuse, or consider that it will be the means of preserving innumerable forests of young oaks, which of late years have been destined to destruction, merely for the high prices offered for oak bark. The very interesting observations made by Mr. White on the Culture of Larches, and their produce at different periods, will be also examined with pleasure by planters.

Mr. Tilley's Hydro-pneumatic Blow-pipe will be found extremely useful in many of the chemical arts. Its cheapness, and the ease and certainty in which it produces an intense and regular flame on the object submitted to its power, will probably render its application extensive.

Some of the advantages arising from that valuable root the Potatoe, have been previously noticed in Mr. Whately's communication. Another application of it as a cheap Paste has been found out by Mr. Drury, and may be the means of saving much wheaten flour, which has been usually consumed in making an article so generally in demand. The machine invented by Mr. Whately will considerably reduce the expense of its preparation.

The Rewards presented the last Session in the class of Polite Arts, have, in point of number been extended beyond what has been usually done in preceding years. The names and performances of the different individuals, will be found recorded in page 22, at the end of the List of Premiums, from which some articles are introduced into the volume, and which will now be noticed.

The instrument for drawing Ellipses, invented by Mr. John Farey, Jun. displays great judgement in its construction, and the variety of cases in which it can be advantageously applied, do infinite credit to the merits of this young and ingenious artist.

The very high encomiums passed by many of the first artists in this metropolis on Mr. Tomkins's invention of refined Ox-gall, as confirmed by numerous certificates, shew the great estimation in which this discovery is held by them.

The slow progress which the art of casting in Bronze had made in this country, induced the Society to offer a premium for its improvement. The figures produced by Mr. Tallmach gave great satisfaction, and some useful hints on this art have been furnished by him.

Mr. Charles Wilson, a man in humble situation, but of persevering application, has taken considerable pains in finding out a method to render oil paintings on canvas more durable. His method will be found easy in execution, and likely to be effectual for the purpose.

Mr. Williams has been rewarded for a new Painter's Easel, which he is of opinion will possess many advantages over those in general use.

On examination of the present volume, it will be found that there is no class of which the Society profess to take cognizance in which rewards have not been given. In that of Manufactures, the great mortality to which Tailors are particularly subjected, has been proved to be a very serious matter of attention, arising from the unnatural posture in which they usually work, and the want of proper ventilation in their workshops. The most serious part of this evil may be removed, by adopting a Shop-board invented by Mr. J. Barralet, and used by him with great improvement to his health.

The destruction by fire, of several capital buildings, in which the business of Cabinet-makers and similar trades have been carried on, owing to the large quantity of loose shavings usually dispersed upon the floors, occasioned the

invention of an ingenious Stove, by Mr. Davis, in which these shavings form a cheap fuel, and the heat is so managed as to enable the glued parts of the work and the veneers to be united in a better and securer manner.

The Class of Mechanics hath as usual occupied much of the time and attention of the Society, and contains a fund of valuable information.

The temporary Rudder invented by Captain John Peat, and by which upwards of 230 persons were saved from perishing, will doubtless be the means of preserving many ships which meet with accidents similar to his. The coolness and intrepidity with which this gentleman conducted himself in this imminent danger, the progressive improvements which he made daily in his temporary Rudder, the effectual manner in which he finally accomplished it, and the great humanity and attention shewed by him to his distressed passengers, do infinite credit to his head and to his heart.

Naval improvements have ever met with the fostering protection of this Society. The ship's Binnacle and Lamp invented by Mr. Grant Preston, will possess very considerable advantages in use.

The

The Elevators of Mr. Thomas Roberts' invention display in their construction great mechanical skill; how far their applications will be rendered useful in the various modes which he has pointed out, time will discover.

The great expense attending the erection of Scaffolds for beautifying and repairing the interior of domes, has excited the exertions of Mr. G. Hughes, who has completed one on a very cheap construction, which has been effectually applied to the intended purpose.

Mr. G. Prior's machine for preventing the ill effects arising to workmen from inhaling the small particles of iron and stone in grinding or pointing Needles, is simply and ingeniously contrived, and likely to be found very beneficial in its application.

Many ships have been taken by the enemy owing to their being surprized before the necessary preparation could be made for firing cannon on the aggressors; Mr. N. Douglas's instrument contrived to fire a cannon instantaneously, is likely to prevent such losses.

To the amateurs of music, Mr. M'Gregor's improvement of the German-flute must afford great satisfaction, and prevent the nicest ear from being offended; the respectable

pectable certificates produced on its exhibition shew the delight which was experienced on trying its effect.

The expense necessary in the construction of Water-wheels, one of the great powers generally employed in mechanics, claims considerable attention. The Pivot or Gudgeon invented by Mr. R. Hughes, and on which the whole axis and wheel is suspended, possesses the advantages of a cheaper construction, greater durability, and more easy repair than those in common use.

Scarcely a week elapses without an account of some accident arising from the breaking or loss of the linch-pins of carriage wheels. Mr. Padbury's invention for retaining the wheel upon the axle, is proved by daily experience on the Bath road to possess the advantages of simplicity and security.

Mr. J. Whitford's mechanical substitute for Leeches in bleeding, will be found of great service on many occasions. The high price of leeches, and the difficulty or even impossibility of procuring them under certain circumstances, give considerable importance to Mr. Whitford's method of producing similar effects in a neat, ingenious, and effectual manner.

The

The necessity of providing plentiful supplies of water in every situation, is too obvious to need any comment. Mr. Stephens has invented and employed a Forcing Pump upon a very cheap construction, by which a supply of water may be furnished from very deep wells, at a moderate expense.

Few circumstances occasion a greater disappointment at the time, than when a benighted or bewildered traveller on a road with which he is not well acquainted, on examining a guide post, finds that the letters have been obliterated. The Guide Post with iron letters invented by Mr. J. Swaine is well calculated to obviate this inconvenience, and better to sustain the attacks of time, or malevolent persons.

Perhaps nothing is more dreadful to the feelings of humanity, than the idea of perishing in the flames, or being dashed to pieces by an effort to escape. The Fire-escape ladder of Mr. Arthur Young possesses the advantages of portability, easy application even in confined courts or passages, and perfect security in escape from the danger.

Mr. H. R. Palmer's new invented Guage not only answers all the common purposes of the carpenter's guage, but has the advantages of marking a line along the center of any parallel or inclined surface, and of finding the cen-

ter

ter of a circle square,or any regular polygon, in a very correct and expeditious manner.

The expanding Centre-bits of Mr. James Stone will be found useful to carpenters and others, by taking out from any plank or flat timber, a circular hole of any required dimensions, under nine inches diameter, and facilitate the operations where such apertures are wanted.

Few matters are of more national consequence than the encouragement of the Fisheries in the seas surrounding our coasts. The Society have continued their exertions for their extension, and the preservation of the fish when taken. Mr. Lewis cured, in the year 1812, above six thousand barrels of Herrings, and from the opinion of Dutchmen concerned in the fisheries, they were of excellent quality, and well cured.

The Herrings cured by the process detailed by Mr. Tho. Stiles were of remarkable fine flavor, and will in many cases form a valuable substitute for anchovies.

The public are indebted to Mr. Phillips London, for the introduction of a new article into the market, viz. *Mackarel pickled whole.* The improvements made by him in refining British salt by fusion, have greatly improved its antisceptic

antisceptic qualities, and tended to preserve a valuable fish from putridity.

A great obstruction to the culture of Hemp in Canada arose from the difficulty of procuring hands to brake and scutch the Hemp to bring it into a state proper for exportation from thence. This inconvenience will, it is hoped, in a great degree, be obviated by the ingenious machinery contrived by Mr. Durand for this purpose.

The Society, ever anxious to encourage latent merit, have had the Plates for the present Volume engraved by Mr. J. Davis, Mr. E. Turrell, Mr. J. B. Taylor, and Mr. J. Bacon, and in a manner that does great credit to these ingenious artists.

The improvements in the Repository of the Society have been continued, and the arrangements of the Models and Machines contained therein, have been executed on a plan which has given great satisfaction to the numerous companies of Ladies and Gentlemen who have examined them. A detailed account of the Articles contained in the Repository will be found at page 283 of the present Volume. The Subscription for further Improvement is still continued, and we annex a List of the Additional Subscribers to it since that published in the Twenty-ninth Volume of the Society's Transactions.

The

The List of the ADDITIONAL SUBSCRIBERS to the Repository :

	£	s.	d.
Subscriptions brought forward	240	17	6
Duke of Northumberland	20	0	0
Earl Percy	10	0	0
Lord Tynham	2	2	0
Hon. Philip Pusey	5	0	0
Isaac H. Browne, esq.	2	2	0
George Bangley, esq.	1	1	0
Richard Barker, esq.	1	1	0
Henry Beaufoy, esq.	1	1	0
Launcelot Burton, esq.	1	1	0
Richard Cater, esq.	2	2	0
George Dyer, jun. esq.	1	1	0
John Hulkes, esq.	1	1	0
John Miller, esq.	1	1	0
Samuel Oxenham, esq.	1	1	0
Charles Richardson, esq.	1	1	0
James E. Saunders, esq.	1	1	0
John Trelawney, esq.	1	1	0
W. H. Timbrell, esq.	1	1	0
Richard Teed, esq.	1	1	0
David Thomas, esq.	1	1	0
Wm. Vaughan, esq.	5	5	0
P. T Westcote, esq.	1	1	0
Henry Winchester, esq.	1	1	0

Balance

Balance of Stewards account of Anniversary Dinner, 1810, presented for this purpose	8	18	6
Ditto, - Ditto, 1811 -	10	5	9

The Library of the Society has been considerably increased by donations and purchase, and affords a very useful reference to such books as comprehend the objects of the Society as well as other literature.

The Society wish to take the present opportunity of returning their Thanks to the different public bodies and individuals who have honoured them with presents, as noted in page 275, of the present volume.

The contents of the present volume will be found considerably more than the usual volumes of the Society. No expense has been spared to explain by very numerous and elegant Engravings the variety of subjects which required such elucidation.

Amidst the devastations of war which have deluged a great part of Europe, the Society have continued in a most flourishing state. They afford more advantages to the public and its members, than can be elsewhere procured on equal terms, and the rewards which they annually confer

extend to an infinite variety of articles beyond those inserted in their list of premiums offered.

With a view to prevent unnecessary repetition in the Communications of their Correspondents, and to avoid the introduction of extraneous matter, the Society have considerably abridged many of the papers sent them; and they desire it to be clearly understood, that as a body they are not responsible for any opinion or representation of facts contained in the following Pages.

Adelphi, Feb. 1814.

*** *In order to afford an Opportunity for the Exertions of Members residing in the Country, the Society have made the following* RULE *and* ORDER, *which they particularly recommend to their consideration.*

PLAN

PROPOSED BY

THE SOCIETY INSTITUTED AT LONDON

FOR THE ENCOURAGEMENT OF

ARTS, MANUFACTURES, AND COMMERCE,

FOR

Establishing Provincial Committees of its Country Members.

Confirmed as a RULE *and* ORDER *of the Society, November* 10, 1813.

THAT Members of this Society residing in Manufacturing or Commercial Towns, or in the Country at a distance from London, be recommended to form themselves into Committees in their respective neighbourhoods.

Each Committee to elect an honorary Secretary from amongst themselves, to correspond with the Secretary of the Society; and any Communication which shall be re-

ceived from the Provincial Committees will be attended to by the Society, and such as in the opinion of the Society shall contain information which may be useful to the Public, will be printed in the Society's Transactions.

The Secretary of each of the Provincial Committees to send to the Society an annual list of the names of the Members of such Committee.

The Provincial Committees to furnish the Society with information respecting the claims for Premiums sent from their respective neighbourhoods.

The Society will provide the Provincial Committees with sufficient numbers of its Rules and Orders and Lists of Premiums for distribution, but reserves to itself the privilege of presenting sets of its Transactions to Provincial Committees, and of affording them such other privileges as may from time to time appear adviseable to the Society.

The Society recommend to the attention of the Provincial Committees, the several objects of the Society as detailed in its Lists of Premiums, and to propose to the Society any other Premiums by which they think its beneficial influence may be extended, and to communicate any improvements which have been practised in their respective

tive neighbourhoods. Their attention also is particularly invited to the Natural and Mineral productions of the Country, and it is desirable they should transmit to the Society specimens of such as they think may be advantageously employed in any of the Arts or Manufactures of the Country, and should they request to have information respecting them, such request will be attended to by the Society, and the Specimens analyzed if necessary.

The Provincial Committees will likewise be expected to favour the Society with Models or Descriptions of any ingenious Machines, or other new and useful Inventions which may come to their knowledge, connected with the Manufactures of the Country; particularly such as shall be invented by any person, who from inadequacy of means may be unable to bring it before the Public.

By Order,

CHARLES TAYLOR, M.D. Sec.

John-street, Adelphi,
Feb. 14, 1814.

CONTENTS.

	Page
Preface - - - - -	iii
New Rule and Order for provincial Committees -	xix
List of Officers - - - -	3
Premiums offered in 1813 - - -	4
General Conditions - - - -	20
Rewards bestowed - - - -	22
Papers in Agriculture - - - -	25
Papers in Chemistry - - - -	81
Papers in Polite Arts - - -	117
Papers in Manufactures - - -	147
Papers in Mechanics - - -	161
Papers in Colonies and Trade - -	252
Presents received - - - -	275
Catalogue of the Models and Machines of the present Year - - - -	279
General Articles in the Society's Repository -	283
List of Members - - - -	307
Index - - - - -	347

PREMIUMS

OFFERED IN THE YEAR 1813.

BY THE SOCIETY

INSTITUTED FOR THE ENCOURAGEMENT

OF

ARTS, MANUFACTURES, AND COMMERCE,

IN THE ADELPHI, LONDON.

THE Meetings of the Society are held at their House in the Adelphi, London; and the consideration of the Claims, offered in the present List, will take place, during the Session of the Society, commencing on the 27th of October, 1813.

ADVERTISEMENT TO THE PUBLIC.

THE Chief objects of the SOCIETY are to promote the Arts, Manufactures, and Commerce of this Kingdom, by giving honorary or pecuniary Rewards, as seems to them best adapted to the case, for all such useful Inventions, Discoveries, and Improvements, (though not mentioned in this book) as tend to that purpose; and, in pursuance of this plan, the Society have already expended above FIFTY THOUSAND POUNDS, advanced by voluntary subscriptions of their members, and legacies bequeathed.

The Register of the Premiums and Bounties they have given, which may be seen at the SOCIETY's house in the *Adelphi*, will show the very great advantages which the Public have derived from this Institution.

The meetings of the SOCIETY are held every *Wednesday*, at seven o'clock in the evening, from the fourth *Wednesday* in *October* to the first *Wednesday* in *June*. The several Committees meet on other evenings in the week during the session, as particularly mentioned in their printed book of Rules and Orders.

In order still farther to promote the laudable Views of the SOCIETY, it may be necessary to explain the mode by which members are elected.

Each member has the privilege, at the meetings of the SOCIETY, or by letter to the Secretary, to propose any person who is desirous to become a member, provided the proposal contains the name, with the full addition, and place of abode, of the proposed member, and is signed by three members of the SOCIETY.

Peers of the Realm or Lords of Parliament are, on their being proposed, immediately balloted for; the names of other persons proposed to become Members are to be delivered to the Secretary, read at the next meeting of the SOCIETY, and then inserted in lists which are hung up in the Society's room: they are balloted for at the second following ordinary meeting. In both cases, if two-thirds of the members then voting ballot in their favour, they are deemed perpetual members upon payment of not less than Twenty Guineas in one sum, or subscribing members upon payment of any sum not less than Two Guineas annually.

All members are entitled to vote and assist in all the business of the SOCIETY and the several Committees. The members have also the privilege of recommending two persons as auditors at the meetings of the SOCIETY, and, by addressing a note to the housekeeper, of introducing their friends to examine the various Models, Machines, and Productions, in different branches of Arts, Manufactures, and Commerce, for which rewards have been bestowed; also to inspect the magnificent series of moral and historical Paintings, executed by the late J. BARRY, Esq. which, with some valuable Busts, Statues, &c. decorate the Great Room.

Members have the use of the Society's Library, which is valuable and annually increasing, from donations of scientific and useful books and engravings. The SOCIETY are highly sensible of the great importance of such acquisitions, and are happy to record them, with the names of the donors, in the Volume annually published of the SOCIETY's Transactions, to which the members are entitled.

Ladies are eligible, as members of the SOCIETY, to all the Privileges thereof, and are alone entitled to vote by proxy at elections, through the medium of any gentleman who is a member, on his producing a written authority for the same.

The time appointed for admission to the Paintings or Models, is from ten to two o'clock, Sundays and Wednesdays excepted.

ORDERED, SOCIETY'S HOUSE, ADELPHI, JUNE 1st, 1813.

That the several Candidates and Claimants, to whom the Society shall adjudge Premiums or Bounties, do attend at the Society's House in the Adelphi, on the last Tuesday in May, 1814, at eleven o'Clock in the Morning precisely, to receive the same; that Day being appointed by the Society for the Distribution of their Rewards: And before that time no Premium or Bounty will be delivered, except to those who are about to leave the Kingdom.

In cases where the Society may think fit to admit excuses for not attending in person, deputies may be substituted to receive the Rewards, provided such Deputies are either Members of the Society, or superior Officers thereof.

A LIST of the Officers of the SOCIETY, *and Chairmen of the several Committees.*

PRESIDENT.

Charles, Duke of Norfolk, F. R. and A. S.

VICE-PRESIDENTS.

John Duke of Bedford, F. A. S.
Hugh, Duke of Northumberland, F. R. and A. S.
G. G. L. Marquis of Stafford, K. G.
Jacob, Earl of Radnor, F. R. and A. S.
Robert, Earl of Liverpool, F. R. S.
Charles, Earl of Romney, F. R. S.
Hon. Robert Clifford, F. R. and A. S.
Sir William Dolben, Bart. L. L. D.
Sir Robert Peel, Bart. M. P.
Sir Watkin Lewes, Knt.
Thomas Pitt, Esq. F. A. S.
Richard Clark, Esq. Chamberlain, F. A. S
Nathaniel Conant, Esq.
Richard Powell, M. D.
John Christian Curwen, Esq.
Richard Wilson, Esq. F. A. S.

CHAIRMEN OF COMMITTEES.

Accounts.

William Lumley, Esq.
Abraham Osorio, Esq.

Correspondence and Papers.
William Tooke, Esq.
Edward Bancroft, M.D. F.R.S.

Polite Arts.
J. Barber Beaumont, Esq. F.A.S.
R. H. Solly, Esq. F. R, and A. S.

Agriculture.
Matthias Deane, Esq.
T. H. Andrew, Esq.

Manufactures.
J. Pearsall, Esq.
J. Trelawney, Esq.

Mechanics.
J. Kenworthey Cooke, Esq.
Thomas Gill, Esq.

Chemistry.
Henry Coxwell, Esq.
G. D. Midgley, Esq.

Colonies and Trade.
William Lewis, Esq. F. L. S.
William Vaughan, Esq.

Miscellaneous Matters.
William Kirkby, Esq.
Daniel Beaumont, Esq.

SECRETARY, Charles Taylor, M. D.
ASSISTANT SECRETARY, Mr. Thomas Woodfall.
HOUSEKEEPER, Miss A. B. Cockings.
COLLECTOR, Mr. Robert Elwin.

PREMIUMS offered in 1813, *by the* SOCIETY *instituted at* London, *A. D.* 1754, *for the Encouragement of Arts, Manufactures, and Commerce.*

PREMIUMS IN AGRICULTURE.

THE candidates for planting all kinds of trees are to mention the nature of the soil, to produce certificates that the respective plantations are properly fenced and secured, and particularly to state the condition of the plants at the time of signing such certificates. Any information which the candidates for the following premiums may choose to communicate, relative to the methods made use of in forming the plantations, or promoting the growth of the several trees, or any other observations that may have occurred on the subject, will be thankfully received.

It is the intention of the Society, that such lands only as are not calculated for the purposes of Husbandry, should be employed for the purposes specified in these advertisements relative to plantations.

Article 1. ACORNS.

FOR having set between the first of October, 1811, and the first of April, 1812, the greatest quantity of land, not less than ten acres, with acorns, with or without seeds, cuttings, or plants of other trees, at the option of the candidate; and for effectually fencing and preserving the same, in order to raise timber; the gold medal.

2. For the second greatest quantity of land, not less than five acres, set agreeably to the above conditions; the silver medal.

Certificates of setting agreeably to the above conditions, and that there are not fewer than three hundred young oaks on each acre, to be delivered to the Society on or before the last Tuesday in December, 1813.

3. RAISING OAKS. To the person who shall have raised, since the year 1809, the greatest number of oaks, not fewer than five thousand, either from young plants or acorns, in order to secure a succession of oak timber in this kingdom; the gold medal.

4. For the next greatest number, not fewer than three thousand; the silver medal.

Certificates that there were on the land, at least the number of young oak trees required, in a thriving condition, two years after the planting, with an account of the methods pursued in making and managing the plantation, to be produced to the Society on or before the first Tuesday in January, 1814.

5. ASCERTAINING THE BEST METHOD OF RAISING OAKS. To the person who shall ascertain in the best manner, by actual experiments, the comparative merits of the different modes of raising oaks for timber, either from acorns set on land properly dug or tilled, from acorns set by the spade or dibble, without digging or tillage, either on a smooth surface, or among bushes, fern, or other cover: or from young plants previously raised in nurseries, and transplanted; regard being had to the expense, growth, and other respective advantages of the several methods; the gold medal.

The *accounts* and proper *certificates*, that not less than one acre has been cultivated in each mode, to be produced to the Society on or before the last Tuesday in Nov. 1813.

6. CHESNUTS. For having sown or set, between the first of October 1811, and the first of April, 1812, the greatest quantity of land, not less than six acres, with Spanish chesnuts, with or without seeds, cuttings, or plants of other trees, adapted to such soil, at the option of the candidate; and for effectually fencing and preserving the same, in order to raise timber; the gold medal.

7. For the second greatest quantity, not less than four acres; the silver medal.

Certificates of sowing or setting, agreeably to the above conditions, and that there are not fewer than three hundred chesnut plants in a thriving state, on each acre, to be delivered to the Society on or before the first Tuesday in January, 1814.

8. ELM. For having planted the greatest number of the English elm, not less than eight thousand, between the twenty-fourth of June, 1811, and the twenty-fourth of June, 1812; and for having effectually fenced and preserved the same in order to raise timber: the gold medal.

9. For the second greatest number, not less than five thousand; the silver medal.

Certificates of having planted agreeably to the above conditions, that the plants were in a healthy and thriving state two years at least after making the plantation, and specifying the distance of the plants, to be delivered to the Society on or before the first Tuesday in April, 1814.

10. LARCH. For having planted out, between the twenty-fourth of June, 1810, and the twenty-fourth of June, 1811, the greatest number of larch trees, not fewer than five thousand, and for having effectually fenced and preserved the same in order to raise timber; the gold medal.

11. For the next greatest number, not fewer than three thousand; the silver medal.

Certificates of the number of plants, that they were in a healthy and thriving state two years at least after they were planted out, with a general account of the methods used in making the plantation, to be delivered to the Society on or before the last Tuesday in December, 1813.

N. B. The larch trees may be planted either mixed with other trees, or by themselves, as may best suit the convenience of the planter.

12. ASH. For having sown or set, in the year 1809, the greatest quantity of land not less than six acres, with ash for timber, with or without seed, cuttings, or plants, of such other trees as are adapted to the soil; the gold medal.

13. For the next greatest quantity, not less than four acres; the silver medal.

Certificates of the sowing or setting, agreeably to the above conditions, that there are not fewer than six hundred ash plants on each acre, in a thriving and healthy condition, two years at least after the sowing or setting, with a general account of the methods used in making the plantation; to be delivered to the Society on or before the last Tuesday in December, 1813.

14. Forest trees. To the person who shall have enclosed and planted, or set, the greatest number of acres (not less than ten) of land, that is incapable of being ploughed, such as the borders of rivers, the sides of precipices, and any land that has too many rocks, or that is not calculated to repay the expense of tillage, owing to the surface being too hilly, mountainous, or otherwise unfit for tillage, with the best sorts of forest trees, namely, oak, Spanish-chesnuts, ash, elm, beech, alder, willow, larch, spruce, and silver fir, with or without screens of Scotch fir, adapted to the soil, and intended for timber trees, between the first of October, 1810, and the first of April, 1811; the gold medal.

15. For the second greatest quantity of land, not less than seven acres; the silver medal.

A particular *account* of the methods used in making and managing the plantations, the nature of the soil, the probable number of each sort of plants, together with proper *certificates* that they were in a healthy and thriving state two years at least after making the plantation, to be delivered to the Society on or before the last Tuesday in December, 1813.

N. B. With the above forest trees, the seeds, cuttings, or plants, of such other trees as are adapted to the soil, and proper for underwood, may or may not be intermixed.

16. Norway Fir Seedlings. To the person who shall have planted in the united kingdom, during the year 1813, the greatest number, not less than two thousand, of red wood and white wood, Norway fir seedlings, at sufficient distances from each other to stand for timber trees; the gold medal.

Certificates of the number of plants, that they were in a thriving state two years at least, after they were planted out, with a general account of the method used in making the plantation, to be delivered to the Society on or before the first Tuesday in December, 1815.

N. B. It is recommended to plant the seedlings of about three or four years growth and in a moderately good soil, somewhat sheltered; the wood from the district of Christiana is esteemed the best for carpenters and joiners use; and for spars and upers the trees near to Long Sound, are most valued.

17. Walnut Trees. For having planted the greatest number of walnut trees, not less than five hundred, between the 24th of June, 1811, and the 24th of June 1812, and for having effectually fenced and preserved the same, in order to raise timber; the gold medal.

18. For the next greatest number, not fewer than three hundred; the silver medal.

Certificates of having planted agreeably to the above conditions, and that the plants were in a healthy and thriving state, two years at least after making the plantations, and specifying the distance of the plants from each other, to be delivered to the Society, on or before the first Tuesday in April, 1814.

19. Securing Plantations of Timber Trees and Hedge Rows. To the person who shall give to the Society the most satisfactory account, founded on experience of the most effectual and least expensive method of securing young plantations of timber trees, and hedge rows, from hares and rabbits, as well as sheep and large cattle, which at the same time shall be least subject to the depredations of wood-stealers; the silver medal.

The *accounts* and *certificates* of the efficacy of the method, to be produced to the Society on or before the first Tuesday in December, 1813.

20. Comparative Culture of Wheat, broad-cast, drilled and dibbled. For the best set of experiments, made on not less than twelve acres, four of which to be sown broad-cast, four drilled, and four dibbled, the two latter in equidistant rows, in order fully to ascertain which is the most advantageous mode of cultivating wheat; the gold medal.

It is required that every operation and expense of each mode of culture be fully described: and that proper *certificates* of the nature and condition of the land on which the experiments were made, together with an *account* of the produce of the corn, the weight per bushel, and also of the straw, be produced to the Society on or before the first Tuesday in February, 1814.

21. Beans and Wheat. To the person who shall have dibbled or drilled between the first of December, 1812, and the first of April, 1813, the greatest quantity of land, not less than ten acres, with beans, in equidistant rows, and hoed the intervals twice or oftener, and shall have sown the same land with wheat in the autumn of the year 1813; the gold medal.

It is required that an account of the sort and quantity of beans, the time of dibbling or drilling, and of reaping or mowing them, the produce per acre thrashed, the expense or dibbling or drilling, hand or horse hoeing, the distance of the rows, and the quality of the soil, together with *certificates* of the number of acres, and that the land was afterwards actually sown with wheat, be produced on or before the second Tuesday in March, 1814.

22. Beans. To the person who, in the year 1812, shall discover and cultivate, either by the drill or dibbling method, on not less than five acres, a species of horse-beans or tick-beans, that will ripen their seeds before the 21st of August; the silver medal.

It is required that a particular account of the bean, the cultivation, and the expence attending it, with proper *certificates* of the nature and condition of the land on which the experiments were made, together with an *account* of the produce, the weight per Winchester bushel, and a sample of not less than a peck, be produced to the Society on or before the first Tuesday in December, 1813. It is apprehended that if a bean should be brought into cultivation with the habits of the hotspur, or other early peas, that it would in a great measure escape the danger arising from the collier-insect, or other insects, and allow more time for the farmers to till the land for the subsequent crop of wheat. The *accounts* and *certificates* to be delivered on or before the last Tuesday in December, 1813.

23. Parsnips. To the person who in the year 1812, shall cultivate the greatest quantity of land, not less than five acres, with parsnips, for the particular purpose of feeding cattle or sheep; the gold medal.

Certificates of the quantity of land so cultivated, with a particular *account* of the nature of the soil and weight of the produce on sixteen perches, and also of the condition of the cattle or sheep fed with the parsnips, and the advantages resulting from the practice, to be produced to the Society on or before the second Tuesday in February, 1814.

24. Buck Wheat. To the person who shall cultivate the greatest quantity of land with buck wheat, not less than thirty acres; the gold medal.

It is required that the time of sowing and reaping be noticed; also a particular *account* of the species, cultivation, and expense attending it, the manner of reaping it, thrashing it, and housing the grain; with proper *certificates* of the nature and condition of the land on which the experiments were made; and the name of the crop, if any, which the same land bore the preceding year, together with an *account* of the produce, and a sample of the seed, not less than a quart, be produced to the Society on or before the second Tuesday in January, 1814.

25. For the next greatest quantity, not less than fifteen acres, on similar conditions; the silver medal.

Information respecting its application to the feeding of cattle, hogs, and poultry, and other of its uses, is also desired. It is known to be particularly serviceable in furnishing honey to bees.

26. Bees, Wax, and Honey. To the person who shall erect, previous to the first day of September, 1813, an apiary containing the greatest number of hives or boxes stocked with bees, not less than sixty; the silver medal, or twenty guineas.

27. For the next greatest number, not fewer than forty stocks; ten guineas.

Proper *certificates* of the number of stocks, and that they have been in the possession of the claimant during the preceding summer, to be produced to the Society on or before the first Tuesday in March, 1814.

It is expected that the claimant will give such particular information on the subject, as may tend to benefit the public, and enable other persons to keep bees to advantage.

28. Raising Grass Seeds. To the person who shall raise the greatest quantity of each of any of the following named grass seeds, *viz.*—Meadow fox-tail (alopecurus pratensis), sweet-scented vernal grass (anthoxanthum odoratum,) Timothy grass (phleum pratense,) meadow fescue grass (festuca pratensis,) smooth-stalked meadow grass (poa pratensis,) rough-stalked meadow grass (poa trivialis;) the silver medal.

It is required that *certificates* from persons who have viewed them in a proper state, to identify that they are one or other of the seeds above-mentioned, indicating clearly the particular species, and noticing the quantity produced of such seeds, free from weeds or mixture of other grasses, together with proper samples of the seeds, be produced to the Society on or before the first day of February, 1814.

29. Preserving Turnips. To the person who shall discover to the Society the best and cheapest method of preserving turnips perfectly sound, and in every respect fit for the purpose of supporting and fattening sheep and neat cattle during the months of February, March, and April; the gold medal.

It is required that a full and accurate *account* of the method employed, and the expense attending the process, together with *certificates* that the produce of four acres at the least have been preserved according to the method described, and applied to the feeding of sheep and neat cattle; that the whole were drawn out of the ground before the first day of February, in order to clear the greater part of it previous to its being prepared for corn, and to save the soil from being exhausted by the turnips; and also of the weight of an average sixteen perches of the crop; be produced to the Society on or before the first Tuesday in December, 1813.

30. For the next in quantity and merit, on not less than two acres; the silver medal.

31. Preserving Cabbages. To the person who shall discover to the Society the best and cheapest method of preserving drum-headed cabbages perfectly sound, and in every respect fit for the purpose of supporting and fattening sheep and neat cattle during the months of February, March, and April; the gold medal.

32. For the next in quantity and merit, on not less than two acres; the silver medal.

Conditions the same as for preserving turnips, Art. 29.—And the *accounts* to be produced on or before the first Tuesday in December, 1813.

33. Preserving Carrots, Parsnips, or Beets. To the person who shall dis-

cover to the Society the best and cheapest method of preserving carrots, parsnips, or beets, perfectly sound, and in every respect fit for the purpose of supporting horses, and fattening sheep and neat cattle, during the months of February, March, and April; the gold medal.

Conditions the same as for preserving turnips, Art. 29.—And the *accounts* to be delivered in, on or before the first Tuesday in December, 1812.

34. For the next in quantity and merit, on not less than two acres; the silver medal.

35. Potatoes. To the person who shall, in the year 1813, cultivate the greatest quantity of land which has not been used for the cultivation of potatoes for the space of twelve years past, not less than fifty acres, with potatoes of such qualities as to be fit for the use of the table in the months of April, May and June, after their growth the preceding year; the gold medal, or thirty guineas.

36. For the next greatest number, not less than twenty acres; the silver medal, or fifteen guineas.

Proper *Certificates* along with other necessary particulars, to be delivered in to the Society, on or before the last Tuesday in April, 1814.

37. These premiums are extended one year further, on similar conditions.

38. Preserving Potatoes. To the person who shall discover to the Society the best and cheapest method of preserving potatoes, two or more years, perfectly sound, without vegetating, and in every other respect fit for the purpose of sets and the use of the table, and consequently of supporting and fattening cattle; the gold medal, or thirty guineas.

It is required that a full and accurate *account* of the method employed, and the expense attending the process, with *certificates* that one hundred bushels at the least have been preserved according to the method described, and that one or more bushels of the same potatoes have been set, and produced a crop without any apparent diminution of their vegetative power, and also that they have been used at table, with entire satisfaction to the person who eat of them, together with a sample of one bushel, be sent to the Society on or before the last Tuesday in December, 1813.

39. For the next greatest quantity, not less than fifty bushels; the silver medal.

40. Making Meadow-Hay in wet Weather. To the person who shall discover to the Society the best and cheapest method, superior to any hitherto practised, of making meadow-hay in wet weather; the gold medal.

A full *account* of the method employed, and of the expense attending the process, with not less than fifty-six pounds of the hay; and *certificates* that at least the produce of six acres of land has been made according to the method described, and that the whole is of equal quality with the sample; to be produced on or before the first Tuesday in January, 1814.

41. Harvesting Corn in wet Weather. To the person who shall discover to the Society the best and cheapest method, superior to any hitherto practiced, of harvesting corn in wet weather; the gold medal.

A full *account* of the method employed, and of the expense attending the process, with not less than two sheaves of the corn, and *certificates* that at least the produce of ten acres has been harvested according to the method described, and that the whole is of equal quality with the samples, to be produced on or before the first Tuesday in January, 1814.

42. Gaining Land from the Sea. To the person who shall produce to the Society an account, verified by actual experiment, of his having gained the greatest quantity of land from the sea, not less than fifty acres, on the coast of Great Britain and Ireland; the gold medal.

Certificates of the quantity of land, and that the experiments were begun after the first of January, 1808, to be produced to the Society on or before the last Tuesday in December, 1813.

43. The same premium is extended one year further.

Certificates to be produced on or before the last Tuesday in December, 1814.

44. Improving Land lying Waste. For the most satisfactory *account* of the best method of improving any one of the following soils, being land lying waste or uncultivated, *viz.* clay, gravel, sand, chalk, peat earth, or bog, verified by experiments on not less than fifty acres of land; the gold medal.

45. For the next greatest quantity, not less than thirty acres; the silver medal.

It is required, that the land, before such improvement, be absolutely uncultivated, and in a great measure useless, and that, in its improved state, it be enclosed, cultivated, and divided into closes.

Certificates of the number of acres, of the quality of the land so improved, with a full *account* of every operation and expense attending such improvement, the state it is in as to the proportion of grass to arable, and the average value thereof, to be produced on or before the first Tuesday in February, 1814.

46. Manures. For the most satisfactory set of experiments, to ascertain the comparative advantages of the following manures, used as top-dressings on grass and corn land, *viz.* soot, coal-ashes, wood-ashes, lime, gypsum, night-soil, or any other fit article; the gold medal.

It is required that the above experiments be made between two or more of the above-mentioned manures, and that no less than two

acres of land be dressed with each manure.

An *account* of the nature of the soil, quantity, and expense of the manure and crops, with *certificates*, to be produced on or before the last Tuesday in February, 1814.

47. Raising Water for the irrigation of Land. To the person who shall discover to the Society the cheapest and most effectual method of raising water in quantities sufficient to be beneficially employed for the purpose of irrigating land, superior to, and cheaper than any other method now in use; the gold medal, or fifty guineas.

A model, on a scale of one inch to a foot, with *certificates* that a machine at large, on the same construction, has been used, specifying the quantity of water delivered in gallons per hour, and the height to which it was raised, to be produced to the Society on or before the first of March, 1814.

48. Paring Plough. To the person who shall invent and produce to the Society a machine or plough for the purpose of paring land preparatory to burning, superior to any hitherto known, or in use for such purpose, and to be worked by not more than one man and two horses; the silver medal, or twenty guineas.

The machine, and *certificates* that at least three acres have been pared by it in a proper manner, to be produced to the Society on or before the first of January, 1814.

49. Machine for Dibbling Wheat. To the person who shall invent a machine, superior to any hitherto known or in use, to answer the purpose of dibbling wheat, by which the holes for receiving the grain may be made at equal distances and proper depths; the silver medal and ten guineas.

The *machine*, with *certificates* that at least three acres have been dibbled by it, to be produced to the Society on or before the second Tuesday in January, 1814.

50. Machine for Reaping or Mowing Corn. For inventing a machine to answer the purpose of mowing or reaping wheat, rye, barley, oats, or beans, by which it may be done more expeditiously and cheaper than by any method now practised, provided it does not shed the corn or pulse more than the methods in common practice, and that it lays the straw in such a manner that it may be easily gathered up for binding; the gold medal.

The *machine*, with *certificates* that at least three acres have been cut by it, to be produced to the Society on or before the second Tuesday in December, 1813. Simplicity and cheapness in the construction of this and the preceding machine, will be considered as principal parts of their merit.

51. Thrashing Machine. To the person who shall invent a machine by which corn of all sorts may be thrashed more expeditiously, effectually, and at a less expense, than by any method now in use; the gold medal.

The *machine*, or a model, with proper *certificates* that such a machine has been usefully applied, that at least thirty quarters have been thrashed by it, and of the time employed in the operation, to be produced to the Society on or before the last Tuesday in February, 1814.

52. Destroying the Grub of the Cockchafer. To the person who shall discover to the Society an effectual method, verified by repeated and satisfactory trials, of destroying the grub of the cockchafer, or of preventing or checking the destructive effects which always attend corn, peas, beans, and turnips, when attacked by those insects; the gold medal.

The *accounts*, with proper *certificates*, to be produced on or before the first Tuesday in January, 1814.

53. Destroying Worms. To the person who shall discover to the Society an effectual method, verified by repeated and satisfactory trials, of destroying worms, or of preventing the destructive effects they occasion on corn, beans, peas, or other pulse; the silver medal.

The *accounts*, with proper *certificates*, to be produced to the Society on or before the first Tuesday in January, 1814.

54. Destroying the Fly on Hops. To the person who shall discover to the Society an easy and efficacious method of destroying the fly on hops, superior to any hitherto known or practised, on not less than four acres of hop ground; the gold medal.

Accounts and *certificates* to be delivered to the Society on or before the first Tuesday in February, 1814.

55. Preventing the Blight, or Ravages of Insects, on Fruit Trees and Culinary Plants. To the person who shall discover to the Society the most effectual method of preventing the blight or ravages of insects on fruit-trees and culinary plants, superior to any hitherto known or practised, and verified by actual and comparative experiments; the silver medal.

The *accounts*, with proper *certificates*, to be delivered to the Society on or before the second Tuesday in December, 1813.

56. Cure of the Rot in Sheep. To the person who shall discover to the Society the best and most effectual method of curing the rot in sheep, verified by repeated and satisfactory experiments; the gold medal.

It is expected that the candidates furnish accurate *accounts* of the symptoms and cure of the disease, together with the imputed cause thereof, and the actual or probable means of prevention, which, with proper *certificates*, must be delivered to the Society on or before the first Tuesday in February, 1814.

57. Cure of the Foot-Rot in Sheep. To the person who shall discover to the Society the best and most effectual method of

curing the foot-rot in sheep; the silver medal.

It is required that the cure be ascertained by repeated and satisfactory experiments, and the method of performing it be verified by proper *certificates* delivered to the Society on or before the first Tuesday in February, 1814.

58. Preventing the ill Effects of Flies on Sheep. To the person who shall discover to the Society the most effectual method of protecting sheep from being disturbed and injured by flies; the silver medal.

It is required that the method be ascertained by repeated experiments, and that a *certificate* of its efficacy be delivered to the Society on or before the first Tuesday in December, 1813.

59. Protecting Sheep. To the person who, in the year 1812, shall protect the greatest number of sheep, not fewer than one hundred, by hovels, sheds, or any other means, and give the most satisfactory account, verified by experiment, of the advantages arising from the practice of protecting sheep from the inclemency of the weather, by hovels, sheds, or any other means; the gold medal.

A particular *account* of the experiments made, with the advantages arising therefrom, together with the expense, and *certificates* of its utility, to be produced to the Society on or before the first Tuesday in March, 1814.

N. B. It is required that the *certificates* shall specify the length of time the sheep were so protected, and the manner in which they were maintained during that time; together with the general method of managing them.

60. Culture of Hemp. The Society wishing to encourage the growth of hemp for the use of the navy in every part of the united Empire, offer to the person who shall sow with hemp, in drills at least eighteen inches asunder, the greatest quantity of land in any part of the united Empire, not less than fifty acres statute measure, in the year 1813, and shall at the proper season cause to be plucked the summer hemp, (or male hemp bearing no seed) and continue the winter hemp (or female hemp bearing seed) on the ground until the seed is ripe; the gold medal.

61. To the person who shall sow with hemp, in drills at least eighteen inches asunder, the next greatest quantity of land in any part of the united Empire, not less than twenty-five acres, statute measure, in the year 1813, and shall at the proper season cause the same to be plucked as above-mentioned; the silver medal.

Certificates of the number of acres, of the distance of the drills, of the plucking of the hemp, with a general *account* of the soil, cultivation, and produce, to be delivered to the Society, along with fourteen pounds of the hemp and two quarts of the seed, on or before the second Tuesday in January, 1814.

62. Feeding of Cattle. For the best experiments on stall feeding of cattle (not less than five head) to be continued for the space of twelve months, in order to prove the earliest maturity and greatest propensity to fatten, of the most approved breeds of cattle in Great Britain, specifying the nature of the food given, together with the daily consumption of each beast, with its weekly increase in weight, and such other observations as may be deemed of consequence; the gold medal.

A full *account* of the methods employed, and of the expenses attending the same, and *certificates* of the sundry matters stated, to be produced on or before the second Tuesday in January, 1814.

PREMIUMS FOR DISCOVERIES AND IMPROVEMENTS IN CHEMISTRY, DYEING, AND MINERALOGY.

63. Preserving Seeds of Vegetables. For the best method of preserving the Seeds of plants in a state fit for vegetation a longer time than has hitherto been practised, such method being superior to any known to the public, and verified by sufficient trial, to be communicated to the Society on or before the last Tuesday in December, 1813; the gold medal, or thirty guineas.

64. Preventing the Dry-Rot in Timber. To the person who shall discover to the Society the cause of the dry-rot in timber, and disclose a certain method of prevention superior to any hitherto known; the gold medal, or thirty guineas.

The *accounts* of the cause, and method of prevention, confirmed by repeated experiments, to be produced to the Society on or before the last Tuesday in Dec. 1813

65. Preserving salted Provisions from becoming rancid or rusty. To the person who shall discover to the Society the best, cheapest, and most efficacious method of preserving salted provisions from becoming rancid or rusty; the gold medal, or thirty guineas.

A full *description* of the method, with proper *certificates* that it has been found on repeated trials to answer the purpose intended, to be produced to the Society on or before the first Tuesday in February, 1814

66. Refining Whale or Seal Oil. For disclosing to the Society an effectual method of purifying whale or seal oil from the glutinous matter that incrusts the wicks of lamps, and extinguishes the light though fully supplied with oil; the gold medal, or fifty guineas.

It is required that the whole of the process be fully and fairly disclosed, in order that satisfactory experiments may be made by the Society to determine the validity of

the claim; and *certificates* that not less than twenty gallons have been purified according to the process delivered in, together with two gallons of the oil, in its unpurified state, and two gallons so refined, to be produced to the Society on or before the second Tuesday in February, 1814.

67. Manufacturing Tallow Candles. To the person who shall discover to the Society a method of hardening or otherwise preparing tallow, so that candles may be made of it which will burn as clear and with as small a wick as wax candles, without running, and may be afforded at a less expense than any at present made with spermaceti; the gold medal, or fifty guineas.

Certificates that 112lb. of such tallow have been made into candles, and 12lb. of the candles made thereof, to be produced to the Society on or before the Second Tuesday in January, 1814.

68. Candles from Resin or other Substances. To the person who shall discover to the Society the best method of making candles of resin, or any other substance, fit for common use, at a price much inferior to those made of tallow only; the gold medal, or thirty guineas.

Six pounds at least of the candles so prepared, with an *account* of the process, to be delivered to the Society on or before the last Tuesday in December, 1813.

69. Method of separating Sugar in a solid Form from Treacle. To the person who shall discover to the Society the best method of separating sugar from treacle, in a solid form, at such an expense as will render it advantageous to the public; the gold medal, or fifty guineas.

A quantity of the sugar so prepared in a solid form, not less than thirty pounds weight, with an *account* of the process, and *certificates* that not less than one hundred weight has been so prepared, to be produced to the Society on or before the first Tuesday in February, 1814.

70. Increasing Steam. To the person who shall invent and discover to the Society a method, verified by actual experiments, of increasing the quantity or force of steam, in steam-engines with less fuel than has hitherto been employed, provided that in general the whole amount of the expenses in using steam-engines may be considerably lessened; the gold medal, or thirty guineas.

To be communicated to the Society on or before the first Tuesday in January, 1814.

71. Substitute for Tar. To the person who shall invent and discover to the Society the best substitute for Stockholm tar, equal in all its properties to the best of that kind; and prepared from materials the produce of the united Kingdom and its Colonies; the gold medal, or one hundred guineas. A quantity of the substitute, not less than one hundred weight, with *certificates* that at least one ton has been manufactured, and that it can be afforded at a price not exceeding that of the best foreign tar, together with an *account* of the process, to be delivered to the Society on or before the first Tuesday in March, 1814.

72. Turpentine from the Scotch Fir or Pinus Sylvestris. For the greatest quantity of turpentine, not less than two hundred weight prepared in Great Britain from that species of fir called the Scotch fir, or Pinus sylvestris, Linn.; the gold medal.

Certificates of the turpentine being prepared from such trees of British growth, together with fifty-six pounds of the turpentine, to be delivered to the Society on or before the second Tuesday in January, 1814.

73. For the next greatest quantity prepared, not less than one hundred weight, on similar conditions; the silver medal.

N. B. The Society being in possession of the method practiced for extracting turpentine from the trees whilst growing, and of samples so procured, information will be given upon the subject, on application for that purpose, at the Society's house.

74. Preparation of Tan. To the person who shall prepare, in the most concentrated form, so as to be easily portable, and at a price applicable to the purposes of manufacturers, the largest quantity, not less than one hundred weight of the principle called by the French *tannin*, which abounds in oak-bark and many other vegetable substances; the gold medal, or thirty guineas.

Certificates of the superior quality of the quantity so prepared, and a sample of not less than 28lb. to be produced to the Society on or before the last Tuesday in January, 1814.

75. Indelible Ink. To the person who shall discover to the Society a method of making a black ink proper for writing, superior to any at present known, indestructible by chemical applications, and not dearer than that which is now in common use; the silver medal, or fifteen guineas.

Certificates that not less than two gallons of such ink have been actually prepared, and found to possess the qualities abovementioned, with a full detail of the process of making it, and two quarts of the ink to be delivered to the Society on or before the second Tuesday in January, 1814.

76. Preparation of a red Stain for Cotton Cloth. To the person who shall communicate to the Society the cheapest and most effectual method of printing or staining cotton cloths with a red colour, by an immediate application of the colouring matter to the cloth, equally beautiful and durable with the red colours now generally procured from decoctions of madder; the gold medal, or fifty guineas.

Certificates that the above process has been advantageously used on ten pieces of calico, each twenty-one yards or upwards in length; one piece of the calico so printed,

a quart of the colour in a liquid state, and a full *account* of the preparation and application to be produced to the Society on or before the second Tuesday in January, 1814.

77. Preparation of a green Colour for printing cotton Cloth. To the person who shall communicate to the Society the best and cheapest method of printing with a full green colour on cotton cloth, by an immediate application of the colouring matter, from a wooden block to the cloth, equally beautiful and durable as the colours now formed from the complicated process of the decoction of weld on alumine, and the solutions of indigo by earths or alkaline salts; the gold medal, or fifty guineas.

Certificates and conditions as for Premium 76.

78. Rendering Muslin less Combustible. To the person who shall discover to the Society a method of rendering muslin less combustible, to be effected by a cheaper and more effectual mode than any hitherto known; the silver medal.

Specimens of the muslin so prepared, with a full account of the process employed for the purpose, to be produced to the Society on or before the first Tuesday in February, 1814.

N. B. It is expected that the means employed shall neither injure the quality of the muslin, stain it, nor damage any print or dye with which it may be coloured.

79. White Substance for the Basis of Paint. To the person who shall produce to the Society the best white substitute, superior to any hitherto known, for the basis of paint, equally proper for the purpose as the white-lead now employed; such substitute not to be of a noxious quality, and to be afforded at a price not materially higher than that of white-lead, the gold medal, or one hundred guineas.

A quantity of the substitute, not less than 50lb. weight, with an *account* of the process used in preparing it, and *certificates* that at least one hundred weight has been manufactured, to be produced to the Society on or before the first Tuesday in January, 1814.

80. Red Pigment. To the person who shall discover to the Society a full and satisfactory process for preparing a red pigment, fit for use in oil or water, equal in tone and brilliancy to the best carmines and lakes now known or in use, and perfectly durable; the gold medal, or fifty guineas.

One pound weight of such colour, and a full disclosure of its preparation, to be produced to the Society on or before the first Tuesday in February, 1814.

N. B. It is not required that the colour should resist the action of fire, or chemical applications, but remain unaltered by the common exposure to strong light, damps, and noxious vapours.

81. Ultramarine. To the person who shall prepare an artificial ultramarine, equal in colour, brilliancy, and durability, to the best prepared from lapis lazuli, and which may be afforded at a cheap rate; the gold medal, or thirty guineas.

The conditions are the same as in the preceding Premium for the red pigment.

82. Blue Pigment from Iron. To the person who shall invent, and discover to the Society, the best blue pigment from iron, superior to Antwerp or Prussian blue in colour and durability, fit for use in oil or water, which may be afforded at a cheap rate; the gold medal, or thirty guineas.

One pound weight of the colour, and a full disclosure of its preparation, to be produced to the Society on or before the first Tuesday in February, 1814.

N. B. It appears from the analysis of lapis lazuli by Klaproth, and the experiments of Guyton, (related in the Annales de Chemie) that ultramarine is a blue sulphurat of iron, and that a blue substance much resembling it is constantly found amongst the scoriæ of blast furnaces where iron is reduced. The Society by offering the above premium wish to call the attention of persons to these facts, and encourage them to make experiments, in the hope of producing a blue pigment which may be substituted for ultramarine.

83. Destructive Effects from Moths. To the person who shall discover to the Society a cheap, easy, and effectual method, verified by repeated and satisfactory trials, of preventing the destructive effects occasioned by moths and other insects, in furs, woollens, and other articles, superior to any hitherto known or practised; the silver medal, or fifteen guineas.

The *accounts*, with proper *certificates*, to be produced to the Society on or before the first Tuesday in January, 1814.

84. Statuary Marble. To the person who shall discover, within Great Britain or Ireland, a quarry, of white marble fit for the purposes of statuary, and equal in all respects to those kinds now imported from Italy; the gold medal, or one hundred guineas.

A block of at least three feet in length, two in height, and two in width, with an account of the situation of the quarry, and *certificates* of its possessing considerable extent, to be produced to the Society on or before the first Tuesday in February, 1814.

N. B. In order to prevent useless expense or trouble to the claimant in forwarding so large a block, the Society will be ready to examine any smaller specimen of the marble, and express their opinion of its value to the candidate before the block required by the above premium is produced.

85. Preparation of Sulphuric Acid, from Sulphur, without the use of any Nitric Salt. To the person who shall prepare the largest quantity, (not less than one ton) of sulphuric acid from sulphur without any nitric salt, of a specific gravity not in-

ferior to the best sulphuric acid of commerce; the gold medal, or fifty guineas.

Certificates that not less than the above quantity of such an acid has been prepared, together with a sample, to be produced to the Society on or before the first Tuesday in January, 1814.

86. Preparation of any alkaline or Earthen Nitrate. To the person who shall prepare, in Great Britain, the largest quantity, not less than one hundred weight, of any salt of nitric acid, with either earths or alkalis, by a method superior to, and as cheap as those hitherto practised; the gold medal, or one hundred guineas.

Certificates of the above quantity having been prepared, and a sample of not less than 28lb. to be produced to the Society on or before the last Tuesday in January, 1814.

87. Fine Bar Iron. To the person, in Great Britain, who shall make the greatest quantity of bar-iron, not less than ten tons, with coak, from coak pigs, equal in quality to the best iron imported from Sweden or Russia, and as fit for being converted into steel; the gold medal, or fifty guineas.

Samples, not less than one hundred weight, with *certificates* that the whole quantity is of equal quality, to be produced to the Society on or before the first Tuesday in January, 1814.

88. Preserving Iron from Rust. To the person who shall invent and discover to the Society a cheap composition, superior to any now in use, which shall effectually preserve wrought iron from rust; the gold medal, or fifty guineas.

A full description of the method of preparing the composition, with *certificates* that it has stood at least two years unimpaired, being exposed to the atmosphere during the whole time, to be produced to the Society, with ten pounds weight of the composition, on or before the first Tuesday in January, 1814.

89. Refining Block Tin. To the person who shall discover to the Society the best method of purifying or refining block-tin, so as to render it fit for the finest purposes to which grain-tin is now applied, and not higher in price; the gold medal, or fifty guineas.

Certificates that not less than three tons have been so refined or purified, with a full detail of the process, and a quantity, not less than one hundred weight, of the tin so refined, to be produced to the Society on or before the first Tuesday in January, 1814.

90. Glazing Earthen-Ware without Lead. To the person who shall discover to the Society, the cheapest, safest, most durable, and most easily fusible composition, fit for the purpose of glazing the ordinary kinds of earthen-ware, without any preparation of lead, and superior to any hitherto in use; the gold medal, or thirty guineas.

Specimens of the ware so glazed, with proper *certificates* of its having succeeded, and a sample of the materials made use of, to be produced to the Society on or before the first Tuesday in February, 1814.

91. Cobalt, Zaffre, and Smalt. For the discovery of a mine of cobalt in Great Britain or Ireland, that will produce a sufficient quantity of the mineral, of good quality, to supply a manufacture of Zaffre or Smalt; the gold medal, or thirty guineas.

Certificates that at least one ton of the ore has been raised; and five pounds of Zaffre, and ten pounds of Smalt made therefrom, to be produced to the Society on or before the last Tuesday in March, 1814.

N. B. It appears from the minutes of the Society, in 1755, that a discovery of cobalt was made at or near Truro in Cornwall, but not a sufficient quantity of ore found to answer the desired purpose.

92. Refining Copper from the Ore. To the person who shall discover to the Society the best method of separating, purifying, and refining copper from the ore, so as to render it fit for the finest purposes to which fine copper is now applied, and by a process superior to any hitherto known or in use, and not higher in price; the gold medal, or fifty guineas.

Certificates that not less than three tons have been so prepared or refined, and a quantity not less than one hundred weight of the copper so refined, to be produced to the Society, on or before the first Tuesday in February, 1814.

93. Mineralogical Map of England and Wales. To the person who shall complete and publish an accurate mineralogical map of England and Wales, on a scale of not less than ten miles to an inch, containing an account of the situation of the different mines therein, and describing the kinds of minerals thence produced; the gold medal, or fifty guineas.

Certificates of the accuracy of such map, together with the map, to be produced to the Society on or before the first Tuesday in February, 1814. The map to remain the property of the Society.

94. Mineralogical Map of Ireland. The same premium is offered for a mineralogical map of Ireland, on similar conditions.

95. Mineralogical Map of Scotland. The same premium is offered for a mineralogical map of Scotland, on similar conditions.

96 Natural History. To the author who shall publish, in the year 1813, the natural history of any county in the united kingdom; the gold medal, or fifty guineas.

It is required that the several natural productions, animal, vegetable, and mineral, peculiar to the county, or found therein, be carefully and scientifically arranged and described, in order that the public may be enabled to judge what arts or manufactures are most likely to succeed in such county. The work to be delivered to the Society on or before the last Tuesday in January, 1814, and a copy to be the property of the Society.

PREMIUMS IN POLITE ARTS.

97. HONORARY PREMIUMS FOR DRAWINGS BY NOBILITY. For the best original drawing of any kind, by young gentlemen under the age of twenty-one, sons, or grandsons of peers or peeresses in their own right, of Great Britain or Ireland; the honorary medal of the Society in gold.

98. The silver medal for the best copy.

99—100. The same premiums will be given, on the like conditions, to young ladies, daughters or grand-daughters of peers or peeresses in their own right, of Great Britain or Ireland.

101. HONORARY PREMIUMS FOR DRAWINGS BY GENTLEMEN. For the best original drawing of any kind, by young gentlemen under the age of twenty-one; the gold medal.

102. For the best copy the silver medal.

103—104. The same premiums will be given, for drawings by young ladies.

N. B. As the foregoing honorary premiums are intended only for such of the nobility and gentry as may hereafter become patrons or patronesses of the arts; persons professing any branch of the polite arts, or any business dependant on the arts of design, or the sons and daughters of such persons, will not be admitted candidates in the above classes, including 97 to 104.

105. DRAWINGS OF OUTLINES. For the best outline, after the plaister cast of the Gladiator Repellens, by persons of either sex under the age of twenty-one, the figure not less than eighteen inches; the silver medal.

106. DRAWINGS OF LANDSCAPES. For the best drawings, in water colours, of a landscape after nature, not less than eighteen inches by twelve, by persons of either sex, under twenty-one years of age; the silver medal.

107. HISTORICAL DRAWINGS. For the best historical drawing, being an original composition of three or more human figures, the height of the principal figure not less than eight inches, by persons of either sex, under twenty-one years of age; the gold medal.

108. For the next in merit; the silver medal.

109. PREMIUMS FOR DRAWINGS IN GENERAL. For the best original drawing of any kind, by persons of either sex, under the age of twenty-one; the gold medal.

110. For the best copy, the silver medal.

111. PERSPECTIVE DRAWINGS OF MACHINES. For the best perspective drawings of machines, by persons under twenty-one years of age; the silver medal.

112. PAINTINGS IN OIL. For the best painting in oil, of a landscape after nature, the size not less than thirty-six by twenty-eight inches; by persons of either sex, under twenty-five years of age; the gold medal.

113. For the next in merit, the silver medal. Each candidate must mention from whence the view was taken.

114. MARINE PAINTING. For the best original painting in oil of a marine subject, the size not less than thirty-six by twenty-eight inches, by persons of either sex, under twenty-five years of age, the lesser gold medal.

115. For the next in merit, the lesser silver medal, on similar conditions.

116. ARCHITECTURAL DESIGNS. For the best original design of a church, consisting of plan, elevation, and section, the gold medallion; the drawings to remain the property of the Society.

117. For the next in merit; the silver medallion on similar conditions.

The following inscriptions to be engraved on these medallions; *The Premium given by the Society for the Encouragement of Arts, Manufactures, and Commerce, in conformity to the Will of John Stock, Esq. of Hampstead.*

118. PLASTER CAST. For the best original model of a single figure, or group not exceeding three figures; the lesser gold medal.

119. For the next in merit; the lesser silver medal, on similar conditions.

N. B. Purity and simplicity are required to be attended to in the general form, as well as correctness in the several parts of the figure.

A cast from the model to remain the property of the Society.

120. BRONZES. For the best drapery figure or group cast in bronze; if a single figure, not less than twelve inches high, and if a group, not less than nine inches; and which will require the least additional labour to repair; the gold medal, or the silver medal and twenty guineas.

The Society, sensible of the great importance of correct Drawing and free Etching, as the best and most solid ground work for the rising school of engraving, offer the following premiums for the pupils of engravers, or others who practice that art.

121. DRAWINGS BY ENGRAVERS PUPILS, &c. For the best finished drawing of the statue of the Discobolus, No. 34, in the British Museum; the size of the drawing not less than eighteen inches, by persons under twenty-one years of age; the silver medal.

122. DRAWINGS OF THE HAND AND FOOT. For the best drawing with a reed, or common pen, of the human hand and foot, the size of life, or larger; the several parts marked with anatomical accuracy; the lesser silver medal.

123. PEN DRAWING OF A HEAD. For the best free pen drawing of the head of Homer, marked No. 33, in the British Museum, not less than twelve inches in height; the lesser silver medal.

N. B. Those artists who are inclined to make trial for the premiums in drawing of the Discobolus, or the head of Homer, (with permission of the trustees) at the British Museum, in the room marked X, may be informed by the Secretary, of the proper mode of applying for that permission.

124. Etching of an Historical Subject. For the best free etching in historical composition from a picture of eminence; the gold medal.

125. For the next in merit; the silver medal.

126. Etching of a Landscape. For the best free etching in landscape composition, from a picture of eminence; the silver medal.

127. Etching of a Portrait. For the best free etching of a portrait; the silver medal.

128. Historical Engraving. For the best finished engraving in historical composition, wherein the chiaro scuro is required to be particularly attended to; the gold medal.

129. For the next in merit; the silver medal.

130. Landscape Engraving. For the best finished engraving in landscape composition, wherein the same attention to chiaro scuro will be required; the gold medal.

131.—For the next in merit; the silver medal.

132. Engraving of a Portrait. For the best finished engraving of a portrait, with equal attention to chiaro scuro; the gold medal.

133. For the next in merit; the silver medal.

N. B. In the class of finished engravings the Society require a forward aquafortis impression, and two in progressive states of the plate; and a finished proof to be sent, and to remain with the Society.

134. Engraving on Wood Blocks. For the best engraving on wood blocks of an historical subject; the size of the principal figure not less than six inches in height, and the block to be at least twelve inches by nine; the gold medal.

Two or more impressions, with the block, to be produced to the Society. The impressions, but not the block, to remain the property of the Society.

135. For the next in merit; the silver medal, on similar conditions.

136. Medal Die Engraving. For the best die engraving of one or more heads after the engraver's own model; the gold medal.

137. For the next in merit; the silver medal.

138. For the best die engraving of one figure, or a group consisting of not more than three figures, after the engraver's own model; the gold medal.

139. For the next in merit; the silver medal.

The dies, with two impressions or casts, and the model, in each claim for medal die sinking, are to be produced to the Society. The impressions or casts, but not the model or die, to remain the property of the Society.

140. Black Lead Pencils. The silver medal, or twenty guineas, is offered to the person who shall discover an effectual method of freeing black-lead from impurity, and improving its quality, for the purposes of the arts.

N. B. The object of this premium is to obtain hard or soft pencils, uniformly of a good quality.

CONDITIONS.

FOR THE POLITE ARTS.

No articles in the class of polite arts, whether for claims or bounties, are to be admitted into the Society after the first Tuesday in March, 1814.

No person who has gained the first premium in any class shall be admitted a candidate in a class of inferior age; and no candidate shall receive more than one premium in one year.

No person shall be admitted a candidate in any class, who has already obtained the first premium in that class.

No more than one performance in any class shall be received from the same candidate.

All performances (to which premiums or bounties are adjudged) shall remain with the Society until after the first Wednesday in June, 1814, when they will be re-delivered, unless mentioned in the premiums to the contrary.

No performance shall be admitted, that has obtained a reward from any other society, or academy, or been offered for that purpose.

It is required, that the matters for which premiums are offered, be delivered in without the names, or any intimation to whom they belong appearing; that each particular thing be marked in what manner each claimant thinks fit, such claimant sending with it a paper sealed up, having on the outside a corresponding mark, and on the inside the claimant's name, residence, and age; which paper is not to be opened unless the candidate be successful, or by a special vote of the Society.

To encourage real merit; and prevent attempts to impose on the Society, by producing drawings made or retouched by any other person than the candidate, the Society require a specimen of the abilities of each successful candidate, to be made under the inspection of the committee of Polite Arts.

All candidates in the Polite Arts are required to signify, on their drawings, whether the performances are originals or copies; and to mark thereon the class for which each is intended, and if possible to send the originals from which copies are taken.

All copies of drawings, &c. are to be on a different scale from the original.

PREMIUMS FOR ENCOURAGING AND IMPROVING MANUFACTURES.

141. Employment of Females. To the person who shall instruct and employ the greatest number of females, not fewer than twenty, in the making of mens' cloaths, particularly of woollen cloth, and not being for the use of the army or navy; the gold medal, or fifty guineas.

Certificates that the number of women above-mentioned, have been constantly so employed for at least three months, to be produced to the Society, on or before the last Tuesday in March, 1814.

142. For the next greatest number of women so employed, not fewer than ten; the silver medal, or fifteen guineas, on similar conditions.

143. Cloth from Hop-Stalks, Nettles, &c. To the person who shall produce to the Society, the greatest quantity, not less than thirty yards of cloth, at least 27 inches wide, made in great Britain or Ireland, of hop-stalks or bines, nettles, or other raw vegetable substances, the produce of Great Britain or Ireland, superior to any hitherto manufactured from such substances, and which can be generally afforded as cheap as cloth of equal quality and appearance now made from hemp, flax, or cotton, and much finer in quality than any hitherto manufactured in England from hop stalks, &c.; the gold medal, or thirty guineas.

One pound of the thread of which the cloth is made, and thirty yards of the cloth, together with proper *certificates* that the whole is manufactured from hop-stalks, or bines, &c. to be produced to the Society on or before the last Tuesday in December, 1813.

N. B. The Society is already in the possession of cloth made in England from hop-stalks or bines, and nettles, which may be inspected by application to the Housekeeper.

144. Sheep's Wool. To the person who shall prove to the Society that he has sold the largest quantity of Merino wool, or such wool as will answer the same purposes, being the produce of his own flock, in the United Kingdom, for the purpose of being manufactured in superfine cloth, the quantity of wool not less than five hundred weight, in the year 1813; the gold medal.

Certificates, along with samples of the wool, and of cloth manufactured from it, to be produced to the Society on or before the last Tuesday in March, 1814.

145. For the next greatest quantity, not less than two hundred and fifty pounds; the silver medal on similar conditions.

146. Hogs' Bristles. To the person who shall prepare the greatest quantity of bristles, from swine bred in the united kingdoms, equal in quality to those imported from Russia or Prussia, and at as cheap a rate; the silver medal or fifteen guineas.

Certificates that not less than one hundred weight have been so prepared, and a sample of not less than fourteen pounds of such bristles, to be produced to the Society on or before the last Tuesday in February, 1814.

147. Wicks for Candles or Lamps. To the person who shall discover to the Society a method of manufacturing hop-stalks or bines, nettles, or any other cheap material, the growth of Great Britain, so as to render them equally fit for the purpose of supplying the place of cotton, for wicks of candles or lamps; the silver medal, or twenty guineas.

Samples, not less than five pounds weight, of the wick so prepared, to be produced to the Society on or before the last Tuesday in December, 1813, with *certificates* that the whole quantity is equal in quality to the sample.

148. Experiments to ascertain the proper Thickness of Wicks for Candles. To the person who shall make known to the Society the most satisfactory result of a series of experiments actually made by him to determine the best thickness of cotton wicks for candles, so as to obviate the defects of those commonly used; the silver medal, or ten guineas.

Certificates that not less than one hundred weight have been so made, and six pounds of the candles, to be produced to the Society on or before the last Tuesday in February, 1814.

N. B. The intention in offering this premium, is to ascertain the proper thickness or bulk of the wick in proportion to that of the tallow, and to remove the unpleasant consequences and waste arising from the sparkling, or guttering, of the candles in common use.

149. Paper from raw Vegetable Substances. To the person who shall, between the first of January, 1813, and the first of January, 1814, make the greatest quantity, and of the best quality, (not less than ten reams) of good and useful paper, from raw vegetable substances, the produce of Great Britain or Ireland, of which one hundred weight has not been used in manufacturing paper previous to January, 1812, superior to any hitherto manufactured from such substances, and which can be generally afforded as cheap as paper of equal quality and appearance now made from rags; the silver medal or twenty guineas.

N. B. The object of the Society being to add to the number and quantity of raw materials used in this manufacture, it is their wish to include every useful sort of paper, and to introduce such natural products as can be easily and cheaply procured in great quantities. The Society are in possession of two volumes containing a great variety of specimens of paper made from raw vegeta-

ble substances, viz. nettles, potatoe-haulm, poplar, hop-bines, &c. which volumes may be inspected by any person on application to the Housekeeper.

Certificates of the making such paper, and one ream of the paper, to be produced on or before the second Tuesday in January, 1814.

150. Transparent Paper. To the person who shall discover to the Society a method of making paper from the pulp, that shall be perfectly transparent, and of a substance and body equal to foolscap that shall take and bear common writing-ink, with the same facility and correctness as writing paper generally in use; the silver medal, or twenty guineas.

Certificates of the making such paper, an *account* of the process, and one ream of the paper, to be produced on or before the second Tuesday in January, 1814.

151. Chintz Patterns for Calico-Printers. For the best original pattern in a new taste, of light and dark-ground chintz for garment-work, or furniture, fit for the purposes of calico-printers, by persons of either sex; the silver medal. The pattern for which the premium is adjudged to remain the property of the Society.

152. Copper-plate Patterns for Calico-Printers. For the best pattern, in a new style, fit for the purposes of calico-printers for garment-work, or furniture; the silver medal. The pattern for which the premium is adjudged to remain the property of the Society.

N. B. The patterns to be produced on or before the last Tuesday in February, 1814.

153. Gloves equal to French Kid. To the person who shall make known to the Society, a process equal to that of the French, or a superior one; for preparing, dyeing, and finishing the skins, verified by actual experiments, and the communication accompanied with at least a dozen pair of gloves made from skins so prepared in an equal or superior manner; the gold medal, or forty guineas.

Certificates from competent persons fully approving of the result of such experiments, together with the gloves and communication to be produced to the Society on or before the last Tuesday in March, 1814.

154. Improved Cat-Gut equal to Roman or Italian. To the person who shall discover to the Society the best method of manufacturing, in the United Kingdom of Great Britain and Ireland, the intestines of sheep, lambs, goats, or of any other animals, into the article called cat-gut, equally strong, clear, smooth, even, and free from knots, as the best Roman and Italian strings, and at a price not exceeding what they are usually sold for in England; the gold medal, or thirty guineas.

Certificates that not less than fifty pounds weight have been so prepared by the claimant, with a full detail of the process, and samples of the article of various thicknesses, to be produced to the Society on or before the first Tuesday in February, 1814.

154 *. For the next greatest quantity, not less than twenty-five pounds; the silver medal, or twenty guineas, on similar conditions.

PREMIUMS IN MECHANICS.

155. Gunpowder Mills. To the person who, in the year 1813, shall invent and bring to perfection the most effectual method of so conducting the works of gunpowder-mills, in the business of making gunpowder, as to prevent explosion, the gold medal, or one hundred guineas.

Certificates and *accounts* of the method having been put in practice in one or more gun-powder mills in this kingdom, and that it promises, in the opinion of the best judges concerned in such works, to answer the purpose intended, to be produced to the Society on or before the first Tuesday in Feb. 1814.

N. B. As an encouragement to persons to turn their thoughts to improvements of this nature, if any should be made on the present method of conducting the business of gunpowder making, which fall short of the total prevention of explosion, and they are sent to the Society for the sake of humanity, the papers so sent in will receive due consideration, and such bounty or reward will be bestowed as they may appear to merit.

156. Transit Instrument. To the person who shall invent and produce to the Society a cheap and portable transit instrument which may easily be converted into a zenith-sector, capable of being accurately and expeditiously adjusted for the purpose of finding the latitudes and longitudes of places, and superior to any portable transit-instrument now in use; the gold medal, or forty guineas.

To be produced on or before the last Tuesday in January, 1814.

157. Taking Whales by the Gun-Harpoon. To the person who, in the year 1813, shall strike the greatest number of whales, not fewer than three, with the gun-harpoon; ten guineas.

Certificates of the striking such whales, and that they were actually taken in the year 1813, signed by the master, or by the mate when the claim is made by the master, to be produced to the Society, on or before the last Tuesday in December, 1813.

158. *This premium is extended one year further, on similar conditions.*

159. Family Mill. To the person who shall invent and produce to the Society the best-constructed mill for grinding corn for the use of private families, or parish-poor; the construction to be such as to render the working of the mill easy and expeditious, and superior to any hitherto in use; the gold medal, or thirty guineas.

The mill, and *certificates* of its having been used to good effect, to be produced

to the Society on or before the first Tuesday in February, 1814. Cheapness and simplicity will be considered as essential parts of its merit; and the mill or a model, to remain with the Society.

160. Machine for raising Coals, Ore, &c. &c. To the person who shall invent a machine for raising coals, ore, &c. from mines, superior to any hitherto known or in use; and which shall produce the effect at a less expense than those already known or in use; the gold medal, or fifty guineas.

A model of the machine, made on a scale of not less than one inch to a foot, with a *certificate* that a machine at large on the same construction has been advantageously used, to be produced to the Society on or before the second Tuesday in Feb. 1814.

161. Improved Walking-Wheel, or Crane. To the person who shall invent an improved walking-wheel or crane, on which the weight and power of any person or persons shall be applied with the greatest safety and effect, and so contrived that the power can be varied according to the greater or less weight to be raised or lowered; the gold medal, or thirty guineas.

The model on a scale of not less than one inch to a foot, with a proper *certificate* that the machine at large has been employed to good effect, to be produced to the Society on or before the second Tuesday in February, 1814.

162. Machine for raising Water. To the person who shall invent a machine on a better, cheaper, and more simple construction than any hitherto known or in use for raising water out of wells, &c. from a depth of not less than fifty feet; the gold medal, or thirty guineas.

Certificates of the performance of the machine and a model of it, on a scale of not less than one inch to a foot, to be produced to the Society on or before the first Tuesday in February, 1814.

163. Elm Pipes. To the person who shall invent and discover to the Society a substitute for the elm pipes now in common use for the conveyance of water, which shall be cheaper, equally effectual, and more durable than any heretofore employed; the gold medal, or fifty guineas.

It is required that one of the pipes so employed, an accurate *account* of the method used, and every expense attending it, together with satisfactory accounts of its being effectual, to be delivered to the Society on or before the second Tuesday in January, 1814.

164. Laying Wooden Pipes. To the person who shall invent and discover to the Society a superior method of laying or connecting the wooden pipes now in use for conveying water, so as to lessen the injury they receive thereby; the silver medal, or twenty guineas.

It is required that a model, an accurate *account* of the method used, and every expense attending it, together with satisfactory *certificates* of its being effectual, be delivered to the Society, on or before the second Tuesday in January, 1814.

165. Extinguishing Fires. To the person who shall produce to the Society the best and most effectual method of procuring an immediate supply of water in case of fire, or for the means best calculated to prevent or extinguish accidental fires in buildings, superior to any now in use; the gold medal, or thirty guineas.

Certificates of the method having been practised with success, with a full description thereof, to be delivered to the Society on or before the second Tuesday in January, 1814.

166. Boring and Blasting Rocks. To the person who shall discover to the Society a more simple, safe, cheap, and expeditious method than any hitherto known or in use, of boring or blasting rocks in mines, shafts, wells, &c.; the gold medal, or thirty guineas.

Certificates of the method having been practised with success, with a full description thereof, to be delivered to the Society on or before the first Tuesday in January, 1814.

167. Heating Rooms for the Purpose of Manufacturers. To the person who shall invent and discover to the Society a method of heating rooms, superior to any hitherto known or in use, and at a moderate expense, for the purpose of painters, japanners, and other manufacturers, so as to avoid the necessity of iron or copper tunnels going through the rooms to convey the smoke, whereby the danger from such tunnels may be prevented; the gold medal, or forty guineas.

A model or complete drawing and description of the method, with *certificates* that it has been successfully practised, to be delivered to the Society on or before the last Tuesday in March, 1814.

168. Improved Ventilation. To the person who shall invent and produce to the Society a mode of permanently ventilating the apartments in hospitals, workhouses, and other crowded places, superior to any now known or used; the gold medal, or fifty guineas.

A model of the apparatus, and a full *account* of the means by which the effect has been produced, with proper *certificates*, to be delivered to the Society on or before the last Tuesday in February, 1814.

169. Preventing Accidents from Horses falling with Two-wheeled Carriages. To the person who shall invent and produce to the Society a method, superior to any hitherto known or in use, to prevent accidents from the falling of horses with two-wheeled carriages, especially on steep declivities; the silver medal, or fifteen guineas.

A model of the apparatus, and a full *account* of the means by which the effect has been produced, with proper *certificates* that the same has been used with success, to be delivered to the Society on or before the second Tuesday in January, 1814.

170. Improving Turnpike and other Roads. To the person who shall discover to the Society the most effectual and cheapest method, verified by actual experiments, of combining the materials ordinarily employed in making or repairing roads, so as to form them of the hardest consistency by their cementing properties, or by an artificial mixture of earth, stones, &c. altered by heat, or any other mode, so as to form an even, hard, and durable carriage-road, the gold medal, or thirty guineas.

It is required that an accurate *account* of the method used, and every expense attending it, together with satisfactory *certificates* of its being effectual, be delivered to the Society on or before the first Tuesday in March, 1814.

171. Raising the Bodies of Persons who have sunk under Water. To the person who shall invent and produce to the Society a cheap and portable drag, or other machine, superior to those now in use, for the purpose of taking up, in the best and most expeditious manner, and with the least injury, the bodies of persons who have sunk under water; the gold medal, or thirty guineas.

The drag or machine, to answer the purpose intended, to be produced to the Society on or before the first Tuesday in March, 1814.

172. For preventing prejudicial Effects to the Persons employed in Pointing Needles To the person who shall invent and produce to the Society a mode of obviating the prejudicial effects that attend the operation of pointing needles, by grinding them dry, during which the particles of grindstone-dust, and steel, being thrown into the air, and received with it into the lungs, occasion asthma, consumption, and other painful disorders; the gold medal, or thirty guineas.

A model of the apparatus, and a full *account* of the means by which the effect has been produced, together with proper *certificates* of its practicability and adoption, to be delivered to the Society on or before the second Tuesday in March, 1814.

PREMIUMS OFFERED FOR THE ADVANTAGE OF THE COMMERCE OF THE UNITED EMPIRE.

173. Taking Porpoises. To the people in any boat or vessel, who, in the year 1813, shall take the greatest number of porpoises on the coast of Great Britain or Ireland, by gun-harpoon, or any other method, not fewer than thirty, for the purpose of extracting oil from them; the gold medal, or thirty guineas.

Certificates of the number, signed by the persons to whom they have been sold or delivered for the purpose of extracting the oil, to be produced to the Society on or before the last Tuesday in January, 1814.

174. Oil from Porpoises. To the person who shall manufacture the greatest quantity of oil from porpoises taken on the coast of Great Britain or Ireland, in the year 1812, not less than twenty tons; the gold medal, or thirty guineas.

Certificates of the oil having been made from porpoises actually caught on the coast of Great Britain or Ireland, and two gallons of the oil as a sample, to be produced to the Society on or before the last Tuesday in February, 1814.

175. Curing Herrings. To the person or persons who shall, before January, 1814, cure the greatest quantity of white herrings, not less than thirty barrels, equal in all respects to the best Dutch herrings, the same being caught in the British or Irish seas, and cured in a British or Irish vessel or port; the gold medal, or fifty guineas.

176. For the next greatest quantity, not less than fifteen barrels; the silver medal, or twenty guineas.

A sixteen gallon barrel of the herrings to be produced to the Society on or before the first Tuesday in February, 1814, with *certificates*, that the conditions of the premium have been fulfilled, and that the whole were cured in the same manner as the specimen, together with a full description of the process employed.

PREMIUMS OFFERED FOR THE ADVANTAGE OF THE BRITISH COLONIES.

177. Nutmegs. For the greatest quantity of merchantable nutmegs, not less than ten pounds weight, being the growth of his Majesty's dominions in the West Indies, or any of the British settlements on the coast of Africa, or the several islands adjacent thereto, and equal to those imported from the islands of the East Indies; the gold medal, or fifty guineas.

Satifactory *certificates*, from the governor or commander in chief, of the place of growth, with an *account* of the number of trees, their age, nearly the quantity of fruit, on each tree, and the manner of culture, to be produced on or before the first Tuesday in January, 1814.

178. Kali for Barilla. To the person who shall have cultivated, in the Bahama-islands, or any other part of his Majesty's dominions in the West Indies, or any of the British settlements on the coast of Africa, or

the several islands adjacent thereto, in the year 1812, the greatest quantity of land, not less than two acres, with Spanish kali fit for the purpose of making barilla; the gold medal, or thirty guineas.

179. For the next greatest quantity, not less than one acre; the silver medal, or fifteen guineas.

Certificates, signed by the governor or commander in chief for the time being, of the quantity of land so cultivated, and of the state of the plants at the time of signing such *certificates*, to be delivered to the Society, with samples of the kali, on or before the second Tuesday in January, 1814.

180. Destroying the Insect commonly called the Borer. To the person who shall discover to the Society an effectual method of destroying the insect commonly called the borer, which has of late years been so destructive to the sugar canes in the West-India islands, the British settlements on the coast of Africa, and the several islands adjacent thereto; the gold medal, or fifty guineas.

The discovery to be ascertained by satisfactory *certificates*, under the hand and seal of the governor or commander in chief for the time being, and of some other respectable persons, inhabitants of the islands, or other place, in which the remedy has been successfully applied; such *certificates* to be delivered to the Society on or before the first Tuesday in January, 1814.

181. Cultivation of Hemp in Upper Canada. To the person who shall sow with hemp the greatest quantity of land in the province of Upper Canada not less than six arpents, (each four-fifths of a statute acre) in the year 1812, and shall at the proper season cause to be plucked the summer hemp, or male hemp bearing no seed, and continue the winter hemp, or female hemp bearing seed, on the ground until the seed is ripe; the gold medal, or one hundred dollars.

182. To the person who shall sow with hemp the next greatest quantity of land in the same province of Upper Canada, not less than five arpents in the year 1812, in the manner above mentioned; the silver medal, or eighty dollars.

183. For the next greatest quantity of land, in the same province, and in a similar manner, not less than four arpents; sixty dollars.

184. For the next greatest quantity of land in the same province, and in a similar manner, not less than three arpents; forty dollars.

185. For the next greatest quantity of land in the same province, and in a similar manner, not less than one arpent; twenty dollars.

Certificates of the number of arpents, the method of culture, of the plucking of the hemp, with a general *account* whether sown broad-cast or in drills, the expense, soil, cultivation, and produce, to be transmitted to the Society, certified under the hand and seal of the governor or lieutenant-governor, together with 28 lb. of the hemp, and two quarts of the seed, on or before the last Tuesday in April, 1814.

186 to 190. In Lower Canada. Premiums exactly similar in all respects to those held out for the province of Upper Canada, are also offered to the province of Lower Canada.

191 to 195. In Nova Scotia and New Brunswic. Similar premiums in all repects are also offered to the provinces of Nova Scotia, and New Brunswic.

196. Importation of Hemp from Canada, Nova Scotia, and New Brunswic. To the master of that vessel which shall bring to this country the greatest quantity of marketable hemp, not less than one hundred tons, in the year 1813, the produce of Upper Canada, or of one of the above-mentioned provinces; the gold medal.

197. To the master of that vessel which shall bring the next quantity, not less than fifty tons; the silver medal.

Certificates satisfactory to the Society, to be produced by the master of the vessel on or before the first Tuesday in February, 1814, to testify that such hemp was grown and prepared in Canada, Nova Scotia, or New Brunswic.

198. Substitute for Hemp. To the person who, in the year 1813, shall discover and produce to the Society, a substitute for hemp, equally cheap, durable, and applicable to all the purposes for which hemp is now used; the gold medal, or fifty guineas.

A quantity of the substitute, not less than one hundred weight, together with proper *certificates* from the governor or commander in chief, if raised in any of the British colonies, or from the Secretary of the Board of Trade, if raised in the East Indies, to prove that the same has been used with success, to be produced to the Society on or before the last Tuesday in February, 1814.

N. B. The premiums for Nos. 181, *to* 198, *are all extended one year further, on similar conditions. Certificates to be produced at the same time of the year ensuing.*

199. Silk. For the greatest quantity of silk proper for manufactures, not less than one hundred pounds weight produced by any person in Malta, or islands near adjacent thereto, in the possession of Great Britain in the year 1813, from silk-worms bred there; the gold medal, or fifty guineas.

Specimens of the silk, not less than one pound, with an *account* of the method in which the silk-worms were managed; the kind and size of the mulberry-trees from whence they were furnished with food, and particulars respecting the culture of the mulberry-trees for that purpose, to be produced to the Society on or before the first Tuesday in March, 1814.

200. For the next greatest quantity, not less than fifty pounds, on similar conditions; the silver medal, or twenty guineas.

Satisfactory *certificates* from the governor or commander in chief of the district where the said silk was produced, and of the several particulars above-mentioned, to be delivered to the Society along with the samples required.

N. B. The same premiums, on similar conditions, will be given for silk produced in the years 1814 and 1815, *certificates* to be sent at the same time of the years ensuing.

PREMIUMS OFFERED FOR THE ADVANTAGE OF THE BRITISH SETTLEMENTS IN THE EAST INDIES.

201. Bhaugulpore Cotton. To the person who shall import into the port of London, in the year 1813, the greatest quantity, not less than one ton, of the Bhaugulpore cotton, from which cloths are made in imitation of nankeen, without dyeing; the gold medal.

A quantity of the cotton, not less than five pounds weight, in the pod, and five pounds carded, to be produced to the Society, with proper *certificates*, signed by the Secretary of the Board of Trade of Bengal or Bombay, on or before the last Tuesday in February, 1814.

202. Annatto. To the person who, in the year 1813, shall import into the port of London, from any part of the British settlements in the East Indies, the greatest quantity of annatto, not less than five hundred weight; the gold medal.

A quantity of the annatto, not less than ten pounds weight, to be produced to the Society, with proper *certificates*, signed by the Secretary of the Board of Trade of the respective settlement, that the annatto is the produce of such settlement, on or before the last Tuesday in February, 1814.

203. True Cochineal. To the person who, in the year 1813, shall import into the port of London, from any part of the British settlements in the East Indies, the greatest quantity of true cochineal, not less than three hundred weight; the gold medal.

A quantity of the cochineal, not less than three pounds weight, with proper *certificates*, signed by the Secretary of the Board of Trade of the respective settlement, that the cochineal is the produce of such settlement; to be produced to the Society on or before the first Tuesday in February, 1814.

N. B. The Premiums from No. 201 *to* 203 *inclusive, are all extended two years further on similar conditions. Certificates to be produced at the same time of the years ensuing.*

GENERAL CONDITIONS.

AS the great object of the Society in rewarding individuals is to draw forth and give currency to those inventions and improvements, which are likely to benefit the public at large, candidates are requested to observe, that if the *means*, by which the respective objects are effected, do require an expense or trouble too great for *general purposes*, the Society will not consider itself as bound to give the offered *reward*; but, though it thus reserves the power of giving in all cases such part only of any premium as the performance shall be adjudged to deserve, or of withholding the whole if there be no merit, yet the candidates may be assured the Society will always judge liberally of their several claims.

All candidates are to take notice, that no claim for a premium will be attended to, unless the conditions of the advertisement are fully complied with.

All models of machines, which obtain premiums or bounties, shall be the property of the Society; and, where a premium or bounty is given for any machine, a perfect model and description thereof shall be given to the Society.

All the premiums of this Society are designed for Great Britain and Ireland, unless expressly mentioned to the contrary.

The claims shall be determined as soon as possible after the delivery of the specimens.

It is expected that all articles for claims or bounties be sent to the Society, carriage paid.

No person shall receive any premium, bounty, or encouragement, from the Society, for any matter for which he has obtained, or purposes to obtain, a patent, or for which he has obtained, or expects any premium or reward from any other Society.

A candidate for a premium, or a person applying for a bounty, being detected in any disingenuous method to impose on the Society, shall forfeit such bounty, and be deemed incapable of obtaining any for the future.

No member of this Society shall be a candidate for, or entitled to receive, any premium, bounty, or reward whatsoever, except the honorary medal of the Society. The candidates are, in all cases, expected to furnish a particular account of the subject of

their claims; and where certificates are required to be produced in claim of premiums, they should be expressed, as nearly as possible, in the words of the respective advertisements, and be signed by persons who have a positive knowledge of the facts stated.

Where premiums or bounties are obtained in consequence of specimens produced, the Society mean to retain such part of those specimens as they may judge necessary, making a reasonable allowance for the same.

No candidate, not a member, shall be present at any meeting of the Society or Committees, or admitted at the Society's rooms, after they have delivered in their claims, until such claims are adjudged, unless summoned by the Committee.

The Society, anxious to promote the Arts of their country, have adopted the resolution of forming a Collection of Prints, to be open for public inspection; and, having arranged those already in their possession, invite engravers to send etched or finished proofs of their plates; and hope that amateurs, collectors, and publishers of works of art, will also contribute to the undertaking.

Prints of machines, or maps, will also come within the above arrangement.

The Society further invite the communications of scientific and practical men, upon all subjects connected with the views of the Society, although their experiments may have been conducted upon a smaller scale than the terms required by the premiums; as such communications may afford ground for more extensive application, and thus materially contribute to the advantage of the public.

The Library of the Society, which has already become very valuable, may yet receive considerable additions and improvements from the presents of members, or other persons who may be inclined to place useful books or valuable manuscripts in a repository, at once permanent and conducive to the national benefit.

All communications are to be made by letter, addressed to CHARLES TAYLOR, M. D. the Secretary, *at the Society of Arts, &c. Adelphi, London.*

And where articles are sent by Sea for the Society, the Bills of Lading are to be addressed to the care of WILLIAM VAUGHAN, Esq. *Mincing-lane, London,* who has politely undertaken to receive them for the Society.

The Winchester bushel is the measure referred to for grain; and, as the acres of different districts vary in extent, it is necessary to observe, that the Society mean Statute Acres of five and a half yards to the rod or pole, when acres are mentioned in their list of premiums; and they request that all communications to them may be made agreeably thereto.

The Society desire that the Papers on different subjects sent to them may be full, clear, and explicit, fit for publication, and rather in the form of Essays than of Letters: and that descriptive Drawings may be sent, with the Models and Machines laid before the Society.

*** To persons inclined to leave a sum of money to this Society by will, the following form is offered for that purpose.

Item. I give and bequeath to A. B. and C. D. the sum of upon condition and to the intent that they, or one of them, do pay the same to the Collector, for the time being, of a Society in London, who now call themselves the Society for the Encouragement of Arts, Manufactures, and Commerce; which said sum of I will and desire may be paid out of my personal estate, and applied towards the carrying on the laudable designs of the Society.

N. B. The Society considering that it would be beneficial to the Commerce of the United Kingdom to bring the British Marbles into more general use, and that the most effectual method of accomplishing their object would be, for the present, *to make them more generally known in the capital, have come to the following resolutions:—*

Resolved.—That specimens of British Marbles be exposed in the Society's Rooms, in the Adelphi, for the inspection of the public, under the following regulations:

1st. That all the specimens be exact to a given size, *viz.* eight inches high, six inches broad, one inch thick, and polished on one face.

2. That a book be kept, containing the number of each specimen, and describing the situation of the quarry, the name of the parish where situated, the distance of the quarry from a beaten road, and the distance of that road from water-carriage, with the name of the donor and proprietor. Any remarks on the qualities of the marbles, or on the lime produced from them, will be gratefully received and preserved by the Society, as materials for future inquiries.

Resolved,—That as the exertions of the Society can be generally beneficial, only inasmuch as their views are seconded by the public, the Society request, that all persons proprietors of marble quarries, will favour them with a specimen of the marble, worked to the exact size above mentioned, with the description of the quarry as above, that the same may be entered in the book to be preserved for the use of the public. By such arrangements, it is expected that the interest of the proprietors of the quarries will be promoted, and the use of British marble much extended. A variety are already exhibited in the Society's Great Room.

The Society take this opportunity of returning their thanks to the several Societies and Individuals, who have favoured them with presents for their Repository and Library.

Premiums and Rewards bestowed by the Society of Arts, Manufactures and Commerce, Adelphi, during their Session, which commenced on the fourth Wednesday in October, 1812, and closed on the 2d of June, 1813.

ON Tuesday the 25th of May, his Grace the DUKE of NORFOLK, the President, distributed the Rewards then adjudged.

IN AGRICULTURE.

To Major Bryan Hesleden, of Horton, in Ribblesdale, Yorkshire, for improving upwards of 177 acres of waste land, class 44. The gold medal.

To W. C. Knowlys, Esq. of Woods-farm Lodge, near Crawley in Sussex, for improving 308 acres of waste land. The lesser gold medal.

To John Maurice Jones, Esq. of Chester, for planting 979,939 timber trees in North Wales. The lesser gold medal.

To Patrick Steuart, Esq of Auckrunhart, Banffshire, for planting 380,000 larch, 390,000 Scotch firs, and 10,000 birch trees, in North Britain. The lesser gold medal.

To Mr. Leonard Phillips, Jun. Arborist, experimental Horticulturist and Agriculturist, of the Portsmouth road, about a quarter of a mile beyond Vauxhall Turnpike, for planting upwards of 5000 sorts of hardy fruit trees. The lesser gold medal.

To William Backhouse, Esq. of Shull House, near Wolsingham, Durham, for planting 300,000 larches, and 50,000 other timber trees, class 10. The gold medal.

To Jonathan Backhouse, Jun. Esq. of Darlington, Durham, for planting 271,000 larches, class 11. The silver medal.

To Mr. Edward Knight, of Great Barfield, Essex, for the growth of a crop of beans, and sowing wheat on the same land, the same year, and thus preventing the necessity of a fallow, class 21. The gold medal.

To Mr. Edward Knight, of Great Bardfield, Essex, for twenty-one stocks of bees, class 27. Ten guineas.

IN CHEMISTRY.

To Thomas White, Esq. of Woodlands, Durham, for the application of larch bark, to answer all the purposes of oak bark in tanning leather. The lesser gold medal.

To Mr. Charles Drury, of Mansfield, Nottinghamshire, for making an improved paste from potatoes, for the use of bookbinders, trunk-makers, &c. Ten guineas.

IN POLITE ARTS.

To Miss Eliza Phillipps, of Wandsworth Road, for an original drawing of a landscape. The silver medal.

To Miss Louisa Anne Phillipps, of Wandsworth Road, for an original landscape. The silver palette.

To William Harriott, Esq. of West Hall, Mortlake. Surry, for an original drawing of Tintern Abbey. The silver palette.

To William Peart, Esq. at the Rev. George Porters, Billericay, Essex, for a drawing of Rolla, a copy, class 102. The silver medal.

To Master F. Y. Hurlestone, King-street, Covent-garden, for a drawing of Eve, a copy. The lesser silver medal.

To Master A. P. Hurlestone, King street, Covent-garden, for a drawing of St. Jean, a copy. The silver palette.

To Miss A. I. E. Innes Baker, of Dowdeswell, near Cheltenham, for an original drawing of fruit The lesser gold medal.

To Miss Coster, of Hammersmith, for an original drawing of flowers. The silver medal.

To Miss Henrietta Sutherland, of Sloane Square, Chelsea, for a drawing of an oak, a copy. The silver palette.

To Peltro William Tomkins, Esq. New Bond Street, for refining ox gall so as to make it colourless, and by its use, rendering water-colour drawings more bright and permanent. The lesser gold medal.

To Master George Bauke, Tottenham Court Road, for a drawing of Rolla, a copy. The silver palette.

To William Taylor, Jun. Esq. of Yatton, near Leominster, for producing on Wood charred by fire on the surface, the effect of painting by forming the lights with Gouges. The silver medal.

To Miss Margaret Geddes, of Alderbury, near Salisbury, for an original oil painting of a peasant boy. The lesser gold medal.

To Miss Anne Hayter, Wells Street, Oxford Street, for a drawing of the Silence after Bartolozzi, a copy, class 110. The silver medal.

To Mr. Charles Porden, East Lane, Bermondsey, for a design for a palace, original, class 116. The gold medallion, *in conformity to the Will of the late John Stock, Esq. of Hampstead.*

To Mr. Matthew Habershon, Bentinck Street, Manchester Square, for a design of a palace, original, class 117. The silver medallion.

To Mr. G. R. Pain, Diana Place, New Road, for a design for a gothic palace, original. The silver medal.

To Mr. Lewis Valliamy, Pall Mall, for a design for a palace, original. The silver medal.

To Miss M. E. Tomkins, New Bond Street, for a drawing of the head of Jupiter, a copy. The lesser silver medal.

To Miss Anne Steele, No. 3, Union Place,

Lambeth, for a drawing of a landscape, a copy. The lesser silver medal.

To Mr. Charles Russell, Warwick Street, Golden Square, for an outline drawing of the Gladiator Repellens, class 105. The silver medal.

To Mr. John Brewster, Winchester Place, Pentonville, for an outline drawing of the Gladiator Repellens. The lesser silver medal.

To Mr. John Carver, London Street, Fitzroy Square, for an outline drawing of the Gladiator Repellens. The lesser silver medal.

To Mr. William Page, Fitzroy Terrace, Kentish Town, for an outline drawing of the Gladiator Repellens. The silver palette.

To Miss Mary Ann Warren, Constitution Row, Gray's Inn Lane, for a drawing of flowers, a copy. The silver palette.

To Miss Mary Ann Say, Norton Street, Fitzroy Square, for a drawing of Cupidon, a copy. The silver palette.

To Master I. Ward, Buckingham Place, Fitzroy Square, for a drawing of the death of Lucretia, a copy. The lesser silver medal.

To Master I. Robertson, Great Chesterfield Street, St. Mary le-bone, for a drawing of a landscape, a copy. The lesser silver medal.

To Master Jabez Newell, Whitecross Street, for a miniature drawing, a copy. The lesser silver medal.

To Miss Eliza Hay, Tavistock Street, for an original landscape. The silver palette.

To Miss Maria Ann Chalon, Beaumont Street, Devonshire Place, for a drawing of St. James the Elder, a copy. The silver palette.

To Master A. T. Roffe, Ossulton Street, Somers Town, for a drawing of St. John and the Lamb, a copy. The silver palette.

To Master William Ross, Martlett Court, Bow Street, for a drawing of the head of Homer, a copy. The silver palette.

To Miss F. Edwards, No. 27, Great Suffolk street, Blackman Street, for an original drawing of Cupid bending his bow. The silver palette.

To Miss Landseer, No. 33, Foley Street, Portland Chapel, for an original landscape. The silver palette.

To Master T. Landseer, No. 33, Foley Street, Portland Chapel, for an etching of animals. The lesser silver medal.

To Master Edward Landseer, No. 33, Foley Street, Portland Chapel, for a drawing of animals from the life. The silver palette.

To Master John Hayter, Wells Street, Oxford-street, for an outline of Alexander, from a cast. The silver palette.

To Mr. H. Wyatt, Castle Street, Leicester square, for a drawing of the Discobolos. The silver palette.

To Samuel Cousins, St. Mary Steps, Exeter, for a drawing of Ben Jonson, a copy. The silver palette.

To Mr. Charles Wilson, Worcester Street, Borough, for a method of preserving oil paintings from decay. Ten guineas.

To Mr. William Finden, John Street, Fitzroy Square, for an engraving of the Rent Day feast, from a painting by Teniers, class 128. The gold medal.

To Mr. Edward Scriven, Clarendon Square, Somers Town, for an engraving of Gerhard Douw, from a painting by himself. The lesser gold medal.

To Mr. Charles Rivers, Water Lane, Kentish Town, for an engraving of a portrait. The lesser silver medal.

To Mr. William Wyon, Birmingham, for a medal die engraving, the head of Ceres, class 136. The gold medal.

To Mr. S. F. B. Morse, Buckingham Place, Fitzroy Square, for an original cast of the dying Hercules, class 118. The lesser gold medal.

To Mr. William Tallmach, Castle Street East, for a bronze cast of Venus, disarming Cupid, class 120. The silver medal and twenty guineas.

IN MANUFACTURES.

To John Whateley, Esq. of Cork, Ireland, for his invention of a machine for the speedy separation and manufacture of Farina or Flour from potatoes, and for various applications thereof to make sea-biscuits, bread and pastry. The lesser gold medal.

IN MECHANICS.

To Captain John Peat, Bloomsbury Square, for a temporary rudder for the preservation of ships from being lost at sea. The gold medal.

To Mr. John Farey, Jun. Upper Crown Street, Westminster, for an instrument for describing or drawing ellipses of various forms and sizes. The gold medal.

To Mr. George Prior, Jun. of Otley, Yorkshire, for his method of preventing the ill effects arising to the workmen, from inhaling the small particles of iron and stone, in grinding or pointing needles. Twenty-five guineas.

To Mr. Thomas Roberts, Wardour Street, Soho, for an elevator, or a machine which can be raised up to a great height, and employed as a fire escape, an observatory, or for repairs of buildings. The silver medal, and twenty-five guineas.

To Mr. G. Hughes, of Manchester, for a temporary scaffold moving round an upright pole, by the use of which, the interior of domes may be easily repaired or beautified. The silver medal.

To Mr. H. R. Palmer, Fort Place, Bermondsey, for a guage, for the purpose of marking a line along the centre of any parallel, or inclined surface, also for finding the centre of a circle, square, or any regular polygon. The silver medal.

To Mr. Malcolm Mc. Gregor. Bell Yard, Temple Bar, for an improved German flute, capable of being tuned to a greater extent and certainty than any other. The silver medal and twenty guineas.

To Mr. John Padbury, Speenhamland, for

a carriage wheel guard, by which the wheel is retained safe upon the axis, in case of the lynch-pin coming out. The silver medal.

To Mr. Robert Hughes, of Rouaben, Denbighshire, for an improved axis for large water wheels, to prevent the pivot from getting loose in the shaft, or to repair it when damaged The silver medal.

To I. Stephens, Esq. Reading, for a cheap wooden forcing pump, to raise water from deep wells. The lesser silver medal.

To Mr. Samuel Barralet, Cole Harbour Street, Hackney Road, for an improved Shop-board for tailors, by which the diseases are obviated to which this class of men are particularly subject. The silver medal, and ten guineas.

To Mr. Durand, of Canada, for a machine for hackling and scutching hemp. The silver medal.

To Mr. Grant Preston, Burr Street, London Dock, for a ship's binnacle and lamp, by means of which the ship's compass is seen with clearness and certainty. The silver medal.

To N. Douglas, Esq. Chiswell Street, for an instrument for firing cannon, by which, a number of cannon may be fired in quick succession without the necessity of a match. The silver medal.

To Mr. Joseph Davis, Catherine Street, Strand, for a safe and economical mode of burning shavings in workshops, and converting them to useful purposes. The silver medal.

To Mr. A. Young, Jun. Bury Street, Bloomsbury, for a fire escape ladder formed instantaneously, by the application of a jointed pole to a window. The lesser silver medal, and five guineas.

To Mr. James Swaine, Piccadilly, for an improved guide post, the arms of which are made of cast iron with open spaces between and within the letters, so as to be more easily distinguished by day or night. The lesser silver medal.

To Mr. I. Whitford, St. Bartholomew's Hospital, for a mechanical substitute for leeches in bleeding. The lesser silver medal.

To Mr. I. Tilley, Whitechapel, for an Hydro-pneumatic blow-pipe, for the use of enamellers, assayers, and glass-blowers. Fifteen guineas.

To Mr. Frederic Williams, Brown Street, Bryanstone Street, for an improved painters easel. Five guineas.

To Mr. James Stone, No. 79, Great Tichfield-street, for an expanding centre-bit, by which circular holes of various diameters may be made. Five guineas.

IN COLONIES AND TRADE.

To Mr. John Lewis, Broadstairs, for curing 6533 barrels of British white herrings. The gold medal.

To Mr. Thomas Stiles, of Norwich, for curing British white herrings. Twenty guineas.

To Phillips London, Esq. Cannon Street, for curing, or pickling, mackarel. The silver medal.

*** Since the last Distribution of Rewards, SEVENTY-EIGHT new Members have been elected.

The LIST of PREMIUMS offered may be had, *gratis*, at the Society's House in the Adelphi. By Order of the Society,

June, 1813. CHARLES TAYLOR, M. D. Secretary.

N. B. Where errors have arisen in the address of any Member of the Society, information is desired to be given to Mr. R. Elwin, the Collector, at the Society's house in the Adelphi, who receives the Subscriptions from the Members, and furnishes Receipts for the same.

Lately was published, Price 10*s.* 6*d.*

THE THIRTIETH VOLUME of the SOCIETY'S TRANSACTIONS, which may be had from the Housekeeper, at the Society's House in the Adelphi. Also complete sets of their Transactions, or any single Volume.

Also, An ANALYTICAL INDEX of the FIRST TWENTY-FIVE VOLUMES of the TRANSACTIONS of the SOCIETY, to the Termination of their Session, June 1807, price 5 *s.*

A CATALOGUE of the BOOKS in the Society's Library may be procured as above, price One Shilling.

PAPERS

IN

AGRICULTURE.

The GOLD MEDAL, *the Premium offered in Class 44, was this Session adjudged to Major* BRYAN HESLEDEN, *of Horton, in Ribblesdale, Yorkshire, for improving upwards of* 177 *Acres of Waste Land. The following Communications were received from him.*

SIR,

I BEG leave to lay before the Society of Arts, &c. an account of having reclaimed and improved a certain tract of land, containing 177 A. 0R. 9P. statute measure, in the parish of Horton, near Settle, Yorkshire, called Horton Scar, which, previous to the undertaking in 1806, was a Waste entirely uncultivated, and in a great measure useless; with a description of the mode resorted to, and expenses attending thereon.

I have the honour to remain, the Society's
most obedient humble Servant,

BRYAN HESLEDEN.

To C. TAYLOR, M. D. SEC.

The soil consists of three kinds, though the greater part is composed of peat earth, retaining water in such a degree as occasionally to approach the nature of a bog, and covered with a thick, or deep heath, but in parts where the land was tolerably dry the heath was not quite so thick; the soil bordering that which was peat earth was composed of light-coloured clay, mixed with a sort of marl, and adjoining that, a small quantity of red loamy soil, both of which being also covered more or less with heath, or dry, poor and coarse bent or rushes. The peat earth was in some places black, in others of a dark-brown colour, twelve inches in thickness, the next stratum or subsoil consisted of a layer of gravel mixed with a kind of red clay, forming a substance of fifteen inches in thickness, so solid as completely to prevent the water from sinking from the surface, soil, or peat earth ;—next below this was a firm clay.

Since a great object towards the reclaiming land of this description is, in the first place, to take the water from off the surface by a moderate degree of draining, (though it has been observed, that peat earth may in some cases be made too dry or hard by cutting a superabundance of drains), in this instance drains were carried at different distances from each other, according to the quantity of water or moisture which appeared to lodge in the surface soil, from eight to twelve yards, asunder:—Each drain was cut to the depth of thirty inches, being three or four inches into the clay, which was of so solid a nature as to obviate the necessity of flagging the drain in the bottom (a practice which should invariably be adopted when the turf, or gravel, is not cut through); the breadth of the drains is eighteen inches, walled with stones on both sides, forming a sough, or course of six inches wide and eight high, covering it with a flat stone;

on

on level ground, filling them up to the top sod with stones; and if on sloping ground, filling them to the top sod on the higher side only, so as to catch the water in its descent. The main or leading drains were made three, and, in some cases, four feet deep, leaving the sough eight inches wide and ten high; the most heathy parts were then either pared or ploughed, turning the sod the upper side down, laying or bedding them again as level as possible, then sown with hay or grass seeds in the Spring of the year, before the turf got too much dryed or scortched by the sun, in the proportion of ten bushels to an acre; the whole was then covered with lime, laid on, as to quantity, in the proportion to the hardness of the land, in loads (one load containing three bushels) at the distance of eight yards square from each other on an average; the lime caused these sods, without any other assistance, to rot, or decay, in the space of three years, and in two years more, to combine again in such a manner as to form a fine green sward, producing the most fattening grass. That part bordering on the peat earth, and consisting of a light-coloured clayey soil with a mixture of marl, as also that composed of a red loamy soil, where in the like manner drained, wherever the least wet appeared, spreading the clay, marl, and red soil that remained, (after filling the drains) on the surface which contributed materially to assist the lime in destroying the heath and rough bent, &c. &c.; a greater quantity of lime was laid on those parts, namely, the loads at the distance of seven yards from each other, and where the land was perfectly dry without the necessity of draining, at six, and occasionally five yards; this quantity spread on the most heathy parts, assisted by the clay and loam, &c. that was taken out of the drains, completely destroyed the heath in five or six years at the furthest, producing the richest

grass, and in the end answering as well for pasture as that which had been pared or ploughed, and making a saving of the expense of such process. Notwithstanding the situation of the land in question is very high, yet as it is sheltered from different unfavourable aspects by a variety of rising and falling ground, as also bounded by a wall of six feet in height, and is principally intended for the purpose of grazing of Cattle and Sheep, (the latter in particular having been known from experience to thrive best when they had a tolerable extensive range); for these reasons it was deemed unnecessary to divide it into any more allotments or closes than three, the inner, as well as the outer fences being built of stone, six feet in height, three feet wide at the bottom, and sixteen inches at the top, with two rows of throws or large stones going across the wall, and eighteen of them to each rod in length.

The following is a full account of the expenses attendant on this undertaking:

	£.	s.	d.
3718 rods of draining, at 1s. 3d. each on an average	232	7	6
216 rods of main, or leading drains	18	18	0
39 acres paring, at 1l. 2s. per acre	42	18	0
22 acres ploughing, at 1l. 3s. per acre	25	6	0
Sowing with hay seeds, 10 bushels to an acre	12	3	4
15,495 loads of lime, at 7½d. per load	484	4	4½
Carting of ditto, at 17s. per every 100 load	131	14	1¾
Spreading of ditto, at 3s. per ditto	23	4	10
Walling 454 rods of stone fence, at 7s. per rod	158	18	0
Total	£1,129	14	2¼

This

This money has been expended in the course of the last six years with the greatest œconomy and attention, at the rate of 1881 5*s.* 8*d.* on an average annually, intending it, as has been before observed, for the purpose of fattening cattle. Even when it is desirable that land of this description should be occupied in tillage, it will be necessary to adopt the same measures, such as draining, ploughing or paring, and limeing more or less, &c. in the first instance.

Subjoined is a statement of the number of cattle and sheep fattened and sold to the butcher in the course of the last summer, namely, in 1812, with the sums they respectively yielded of profit.

36 English and Scotch cows and heifers, £ 3. each - - - -	£	108	0 0
100 wether sheep, at 17s. each - -		85	0 0
	£	193	0 0
Deducting 2s. 9d. per acre, the utmost value of the land previous to the improvement - - - -		19	18 3
	£	173	1 9

Thereby leaving for the money so expended a profit of 15*l.* 3-10ths per cent. The value of the land for the remaining part of the year amply repaying the interest for the capital employed in the purchase of stocks, viz. for cattle and sheep.—Although the profit arising from this ground, so lately a tract of waste, in the space of one summer, is very encouraging, its improvement may be said to be yet in its infancy, as it will undoubtedly continue to increase in value for a number of years to come.

Trusting that this will be sufficient to induce others who have land in a similar condition, to adopt a like system, and confident that there are several very extensive tracts of land, of trifling value to the owners at present, in the Northern Counties, as also some in the Southern (particularly that of Dartmoor in Devonshire) which might be improved with the greatest advantage to the Proprietor, as well as that of the community, notwithstanding the price of labour might be somewhat higher *, and the materials, such as lime and stone, were double that which has been here stated. Amongst other benefits resulting from the Proprietor employing his capital in this way, the following may be reckoned as deserving attention, from observations the writer has made, and which he begs leave to state, as being deduced not from theory alone, but from practice and observation.

1st, His security is permanent, and with certainty of an increased rent or profit, sooner or later. 2ndly, In proportion to the increased rent or profit he gains, in that ratio does he contribute to the revenue of the state. 3dly, It increases the demand for labour, and augments the rate of wages, thereby tending in a material degree to lessen the amount of the poor rates. 4thly, It encourages industry by affording employment to a class of labourers, some of whom otherwise might remain in idleness, and ultimately give way to beggary, or probably worse habits. 5thly, By draining the moisture from the surface of the land, the air is rendered less impure, consequently the

* The price of labour is probably as high here as in most other parts, a labourer receiving generally three shillings, or three and sixpence a day, though materials are at a low rate compared with some situations, limestone being dug up in the premises, and coal within two miles distance.

country

country becomes more healthy. 6thly, Increasing the produce of the earth provides for the sustenance of mankind, an object truly desirable at a time when the increased population appears more than the produce of our land for their necessary support. 7thly, The satisfaction, mixed with the pleasing reflections the owner must feel on viewing groups of cattle and sheep fattening on food he had been himself instrumental in procuring for them, or in observing crops of corn and grass to spring and flourish on places where neither he nor any one else had ever before witnessed any. Lastly, The turning his attention to this object may be a means of keeping the body in health, the mind at ease, and prevent him from giving way to habits much less honourable or praiseworthy.

BRYAN HESLEDEN.

Horton, January 20th, 1813.

To C. Taylor, M. D. Sec.

Certificates.

This is to certify, that Major Bryan Hesleden, of Brackenbottom, in the parish of Horton, in Ribblesdale, and county of York, hath reclaimed and improved three inclosures situate at Horton Scar in the said parish, containing by admeasurement one hundred and seventy acres and upwards—the said three inclosures previous to the improvement consisted entirely of bogs, peat and heath; and from a state of comparative sterility, are now become rich pasturage for the feeding of cattle.—As witness my hand, the 20th of January, 1813.

George Holden,
Minister of Horton.

This is to certify, that three closes or parcels of ground, belonging to Major Bryan Hesleden, of Brackenbottom,

situate on Horton Scar, in the parish of Horton, in Ribblesdale and county of York, containing one hundred and seventy-seven acres and nine perches, have been carefully examined and surveyed by me, and I may aver with propriety, that the said inclosures were either bog, peat or heathy ground, in a great measure useless and unproductive prior to the extraordinary improvement that has lately taken place, but are now in such a state of cultivation as to be properly adapted to the purposes of grazing, &c.

As witness my hand, this 20th day of January, 1813.

J. M. Hodgson,
Land Surveyor.

I certify, that I fed in the course of the summer 1812, on the lands lately improved by Major Hesleden, called Horton Scar Pasture, the following cattle and sheep, which when sold yielded profit on an average as follows:—

16 English cows	-	£48	0	0
20 Scotch heifers	-	60	0	0
100 wether sheep	-	85	0	0
		193	0	0

I calculated the value of the grass for the autumn and winter sufficient to pay the interest of the money laid out in the cattle, &c.

This profit arises solely from the effects of improvements, and it will increase in value for some years to come, by being able to feed a greater number of stock upon it, &c.

Witness my hand,
William Holgate.

Horton, January 20th, 1813.

By information since communicated by Major Hesleden to the Society, from the great improvement of the land, the last season it both with cattle and sheep, yielded to the farmer a much greater profit.

The

The LESSER GOLD MEDAL *of the Society was this Session voted to* W. C. KNOWLYS, *Esq. of Woods Farm Lodge, near Crawley, in Sussex, for improving* 308 *Acres of Waste Land. The following Communication was received from him.*

SIR,

I AM encouraged to send to the Society of Arts, &c. a statement of my improvements on the land I have purchased in St. Leonard's Forest and at Slaugham Park, and which I have converted from a wild unprofitable and uncultivated state into a valuable cultivated one, and have also planted upon it above 350.000 trees. The particulars are as follow. In 1804 and 1805, I purchased 308 acres of land of the above description, about three miles from Crawley in Sussex, and thirty three miles from London, on the great road from thence to Brighthelmstone. The land was covered with heath, furze, fern or brake, swamps, pollards and stumps of old birch and beech trees, and part of it was a rabbit warren. The soil is light, rather sandy, with a shrave or thin layer of iron-stone below.

Since my attention to its cultivation the land has been grubbed, pared and burnt, many of the birch and beech pollards cut down, and the rabbit warren destroyed.

The whole is now cleared and inclosed with a quickset hedge, forming a fence of nearly four miles long if placed in a right line. The property is divided into arable, pasture and woodlands, on which I have planted the following trees, viz.

Scotch fir - - -	80,000
Larch - - - -	80,000
Alder - - - -	50,000
Beech - - - -	50,000
Elm - - - -	15,000
Hazel - - - -	10,000

The

The rest are limes, oak, ash, hornbeam, chesnut, planes, and other trees, in the whole above 350,000 trees.

The plantations form a belt round the grounds, and in many parts are formed into clumps, comprizing in the whole about eighty acres of wood land, besides the belt. The trees cost about three-pence a-piece, many of them are now five or six years old, and are becoming valuable. They will in a few years amply repay the expense, being in a very thriving state, and very few have died. Sensible of the great importance of manure in all farming operations, I have built a stable for the accommodation of some of the Brighton coaches, who change their horses there, and for which I am paid a fair rent. I have engaged to furnish them with straw and litter in exchange for their manure, which affords me a large annual supply at hand, to the great convenience and benefit of my farm. This saves a great part of the expense of sending fifteen miles, to Clay-don Hill, for lime for manure.

I cannot specify in detail the exact and particular statement of the expenses incurred in the clearing, planting, and putting this property into a state of cultivation, as I have not kept a separate account of my purchases, buildings, and other improvements; but I estimate, that in grubbing, clearing, and planting, I have employed ten or twelve men, at fifteen shillings per week each, for above six years, besides my teams of oxen and horses, which have been used for all the purposes requisite for the improvements.

I have built a comfortable villa, with extensive offices, besides barns, outhouses, &c. attached to my farm-yard; also cottages for my workmen, large garden, walls, &c. The land is now inclosed, and in a good state of cultivation, producing wheat, oats, barley, potatoes, carrots,

and

and rotation crops, besides pastures well calculated for sheep, cows, and oxen. The land was not formerly worth more than two shillings and sixpence per acre, but is now worth at least twenty shillings. I have sent Certificates from respectable persons who have seen the ground both in its former and present state, and can testify to the great improvement I have made in this part of the country, than which none wanted it more; and there is now rising in my neighbourhood, with the Honourable Lord Erskine and other gentlemen, a great spirit for planting and cultivating.

If this statement should meet with the countenance and approbation of the Society of Arts, &c. I hope it will induce others to make similar experiments, being fully sensible that country gentlemen cannot better employ their time, either for their amusement or advantage, or to greater benefit for their country, than in cultivating and planting the waste and uncultivated parts of the kingdom. Plantations may be formed in any soil and situation, and they would in time repay the expenses incurred on them, and furnish timber for our naval and domestic purposes.

I have the honour to be, Sir,

Your most obedient humble Servant,

WILLIAM C. KNOWLYS.

Woods Farm Lodge, near Crawley, Sussex,
March 29, 1813.

To C. Taylor, M. D. Sec.

Certificates were received from the Rev. S. J. Lewin, rector of Crawley; Mr. William Lambe, Tilgate House, near Crawley; Mr. John Batchelor, and Mr. Samuel Whapham, both of Slaugham; stating, that they have been,

been, and are well acquainted with the above-mentioned property of Mr. William C. Knowlys, in St. Leonard's Forest and Slaugham Park, near Crawley, in Sussex, both in its former and present state, and believe Mr. Knowlys's statement to be a fair and true account of his improvements.

The LESSER GOLD MEDAL *of the Society was this Session voted to the late* JOHN MAURICE JONES, *Esq. of Chester, for planting* 979,939 *Timber Trees, in North Wales. The following Communications were received from him.*

SIR,

THE national advantages arising from the growth of timber, not only in reference to the supply of that bulwark of our national strength, the Navy, but as its increase would considerably reduce the importation from foreign countries, have of late years much engaged the attention of our great land proprietors; and as they are becoming more correctly appreciated, will be more obviously important. Although our country can boast of numbers of patriotic characters, whose exertions for the public weal are not unfrequently pursued at their own individual inconvenience and loss, yet it is more than can be calculated upon that the operation of this principle will ever extend through the ranks of community. But the planting of timber, especially on lands incapable of any other produce, of which vast tracts are to be found throughout

throughout the kingdom, is now ascertained to combine *private benefit* with *public utility*, to associate *individual profit* with *general advantage*.

The principality of Wales, from the amazing quantity of waste lands with which it abounds, fit only for bearing trees, naturally claims particular attention when the rearing of timber is the subject of consideration, and it is to this part of the kingdom my present remarks are intended to apply.

It is a fact beyond contradiction, that the mountains in the principality of Wales are incapable of improvement in any other way than by plantations of hardy trees; and it is equally certain, that in these situations they may be reared to great advantage. One great obstacle to the practice of planting, is, the distant period at which the crop reaches maturity, and promises remuneration. The unenlightened land owner does not so much estimate the future profits of a plantation, as he does the *present* expense and labour of planting; and hence he views the covering his barren wastes with plants, rather as a precarious speculation than a certain good. The Welsh agriculturist may have heard of, or even read, dissertations on the profitableness of the practice, though even in this respect his means of information is much inferior to those of the English; but besides this he wants the stimulus of general example, and the more powerful incentive of practical evidence. Neither of these have been abundantly furnished till of late years. A laudable example has, however, lately animated many land proprietors to benefit themselves and their country. The spirit of planting is roused, and there seems little doubt of its spreading wider and wider, till the principality be provided with a sufficiency of timber to supply its own consumption; and probably

probably at a future period, afford some for exportation.

It is very evident that Wales was, some centuries ago, remarkably well wooded. Its extensive bogs contain the remains of very magnificent trees; no good reason can therefore be assigned for the same sort of trees not thriving in them again, if judiciously managed. The want of wood and shelter in most part of the principality is one of the circumstances which seems to operate most powerfully in the opinion of enlightened agriculturists, and to its disadvantage, in respect of its produce. This paucity of timber is likewise prejudicial to its general appearance.

Such extensive tracts of country as the mountains, in the various districts, without either trees or hedges to diversify the landscape, are certainly not very gratifying to the eye; this sameness is the more to be regretted, because the levels and vallies are far from conveying the idea of barrenness, nor can it be supposed, that nature intended them to be thus naked and unprotected. It is impossible precisely to ascertain the expense of planting per acre, as it must of course vary according to a thousand different circumstances of soil and local situation; it may, however, be taken generally at from £6 to £8.

After these general remarks, permit me, Sir, to lay before you an account of the number of forest trees I have planted in the counties of Merioneth and Denbigh, during the years 1809 and 1810; for which I presume to offer myself to the Society, as a candidate for the Medal annually bestowed by that admirable institution.

It is impossible to give any accurate estimate of the value of my mountains, some parts of them being worth from 1s. to 2s. of yearly value per acre, while other parts are not worth a farthing. By inclosing and planting the

deep

deep declivities and tops, I have no doubt that the whole might even be raised to the value of 20s. or even 30s. of yearly rent. The present state and value of this land may serve as a specimen of most of the Wastes in Wales, at the same time that it shews to what advantage they might be turned, by industry and care, even in the most remote situations of the principality. In both the districts to which I have alluded, the plantations must also greatly benefit the surrounding vallies as a shelter. For eight months in the year, upon an average, the north west winds prevail, and from this quarter the most furious storms generally blow, the effects of which are very discernible in the appearance of the trees. The soil upon which I have planted is various, but some of it such as is not capable of any other growth, except that of timber; in general it is light and dry, but shallow; part of it rocky and steep, much of it peaty and some mossy. By far the greater part of the district consists of hills: these are partly green, but mostly covered with heath; and the interjacent flats are covered with heath, and rather swampey. Forty bushels of acorns have also been dibbled amongst the trees, and in each county I have formed an extensive nursery, all of which are full of young seedlings. Besides the timber, I have planted above a million of quicksets for hedges and hedge-rows in particular places, which will afford considerable utility and warmth.

I have the honour to be,

Sir,

Your obedient Servant,

JOHN MAURICE JONES.

Chester, January 21st, 1813.

To C. Taylor, M. D. Sec.

Planted

Planted from the 1st of October, 1809, to the 1st of May, 1810.

In the County of Merioneth.

	A.	R.	P.
Reval	0	2	0
Caerleon	2	0	9
Cyfty	2	3	0
Dolfriog	46	3	0

In the County of Denbigh.

Cumddwr	0	30	0
Bwlchy Pare	4	2	0
Gallygannan	37	3	20

Ash	27,467
Beech	29,806
Chesnut (horse)	2,970
—— (Spanish)	1,485
Elm	2,782
Fruit	174
Larch	296,080
Oak	97,942
—— (American)	1,460
—— (Maltese)	79
Poplar, White	1,200
Quicksets	
Scotch fir	495
Silver fir	538
Spruce fir	2,451
Sycamore	12,473
Willow	1,248

From the 1st of October, 1810, to the 1st of May, 1811.

In the County of Merioneth.

Town of Baln	3	3	26
Dolfriog	5	2	0
Cwm Caith	12	1	0

In the County of Denbigh.

Gallygannan	28	2	17

Ash	30,472
Beech	28,427
Chesnut (horse)	1,000
——(Spanish)	5,810
Elm	6,040
Larch	305,600
Oak	82,405
—American	2,060
Poplar, Black Italian	1,603
Quicksets	
Scotch fir	16,060
Silver fir	16,060
Spruce fir	1,260
Sycamore	10,939
Willow	2,300

N. B. Many thousand more trees have been planted in the hedge-rows.

SIR,

SIR,

I HAVE enclosed the certificates of my agents, Mr Williams, of Mold, and Mr. David Pritchard; also of my Planters, Thomas Roberts, and Thomas Jones, which I hope will be satisfactory to the Society.

I have the honour to be,

Your obedient servant,

JOHN MAURICE JONES.

Chester, January 26th, 1813.

To C. TAYLOR, M. D. SEC. &c.

This is to certify, that John Maurice Jones, Esq. of the City of Chester, did plant in inclosures, well fenced with good stone walls, or quickset hedges, 972,939 trees, and 977,000 quicksets at Dolfriog, Gallygannan, and other farms, in the Counties of Denbigh and Merioneth, between the 1st of Oct. 1809 and the 1st of May 1811, at proper distances, in a soil that suits their growth, and that they are in a thriving and healthy condition. Forty bushels of acorns have at the same time been dibbled in the plantations, and the hedge-rows every where planted with stout forest trees.

W. WILLIAMS,

Agent to the said J. M. Jones, Esq.

Mold, January 19th, 1813.

This is to certify, that John Maurice Jones, Esq. did plant in Inclosures, well fenced with good stone walls, at Dolfriog, near fifty acres of land, in the county of

 Merioneth,

Merioneth, between October 1809 and May 1810, at proper distances, in a soil that suits their growth, and that they are now in a thriving and healthy condition.

Bethgelert, Jan. 20, 1813.

The ⋊ Mark of THOMAS JONES, Planter.

DAVID PRITCHARD, Innkeeper.

This is to certify, that John Maurice Jones, Esq. did plant in Inclosures, well fenced with good stone walls or quickset hedges, at Dolfriog and Gallygannan, in the counties of Denbigh and Merioneth, between October 1809, and May 1811, at proper distances, in a Soil that suits their growth, and that they are in a thriving and healthy condition.

Llanarmon, January 18th, 1813.

THOMAS ROBERTS.

Trees planted - -	972,939
Quicksets - - -	977,000
	1,949,939

The

The LESSER GOLD MEDAL *of the Society was this Session voted to* PATRICK STEUART, *Esq. of Auchlunkart, in Banffshire, for planting* 380,000 *Larch Trees,* 390,000 *Scotch Firs, and* 10,000 *Birch Trees, in North Britain. The following Communications were received from him.*

SIR,

I BEG leave to offer myself as a candidate for the premium, article 14, offered by the Society of Arts, &c. and should feel highly gratified in obtaining it. I return you my thanks for the ready communication you favoured me with towards enabling me as a planter to present my claim to the Society. I have great pleasure in stating the good condition of the trees, and that I do not entertain the smallest doubt that they will, with very few exceptions, completely fill the ground. I enclose the attestation of John Cuthbert, my gardener, who, between the 1st October 1809, and the 1st April 1810, planted in pits, made the preceding summer, two years old hard wood trees, to the number of 7,000 also 56,000 seedling Scotch firs; few of the pitted plants have failed, as the land was good, but from its steepness and other reasons, incapable of cultivation by the plough. The 56,000 Scotch firs were planted principally for the purpose of filling up plantations made by me a few years before, and most of them have succeeded.

I also inclose a certificate of Mr. Rennie, nurseryman in Aberdeen, who planted for me in the same season 380,000 larches, 390,000 Scotch firs, and 10,000 weeping birch trees, or one hundred and eighty Scotch acres, of

land, which had been previously inclosed, and drained where necessary. These plants were two years old seedlings, and are in a healthy thriving state, and will completely stock the ground, excepting in about ten acres of the land most exposed to the north and north-west winds. The land was a dry moor, not worth annually one shilling per acre, and the trees were planted at the distance of four feet from each other, mixing them as well as could be conveniently done. I am very partial to the instrument used for the planting, which is similar to a mason's trowel without the curve. In the winter of 1810—11, I caused above 20,000 one year nursed hard wood trees to be planted out with it, and they are in a very thriving state, but I do not think that with older plants the instrument can be used to advantage. The total number of trees planted here between the 1st October 1809, and 1st of April 1810, were, of

Larch, elm, ash, spruce, beech, &c.	7,000
Seedling larch - - - - -	380,000
Of Scotch firs - - - - -	446,000
Of weeping birch - - - - -	10,000
Total	843,000

I have the honour to remain,
Sir,
Your most obedient Servant,
PATRICK STEUART.

Auchlunkart, Banffshire,
Dec. 23d, 1812.

To C. Taylor, M. D. Sec.

A certificate from the Rev. Pat. Forbes, minister of Boharm, declared that the above statement is altogether correct.

A certificate from John Cuthbert, dated Auchlunkart, Dec. 19th, 1812, signed before Alex. Cameran, Esq. justice of peace for Banffshire, testified, that in the course of the winter 1809—1810, he had planted for Patrick Steuart Esq: 56,000 Scotch firs, and in pits two years nursed plants consisting of larch, elm, ash, spruce, planes, beech, &c. to the number of 7000, and that they are in a thriving condition.

A certificate from Alex. Rennie, dated Aberdeen, Dec. 25th, 1812, signed before Francis Gordon, Esq. justice of peace, testified, that between October 1st, 1809, and April 1st, 1810, he had planted for Patrick Steuart, Esq. 380,000 larch, 390,000 Scotch firs, and 10,000 weeping birch, all two years old seedlings. That the ground had been inclosed and drained, and the plantation appeared to be last summer in a thriving state.

The LESSER GOLD MEDAL *of the Society was this Session voted to* JOHN WHATELY, *Esq. of Cork, for his Invention of a Machine for the speedy Separation and Manufacture of Farina or Flour from Potatoes, and for various Observations relative to the necessity of encouraging an extended Growth of Potatoes, and for their Applications in various states, to make Sea Biscuits, Bread, Pastry, &c. The following Communications were received from him. A Model of the Machine, and Specimens of the Biscuits, are placed in the Society's Repository.*

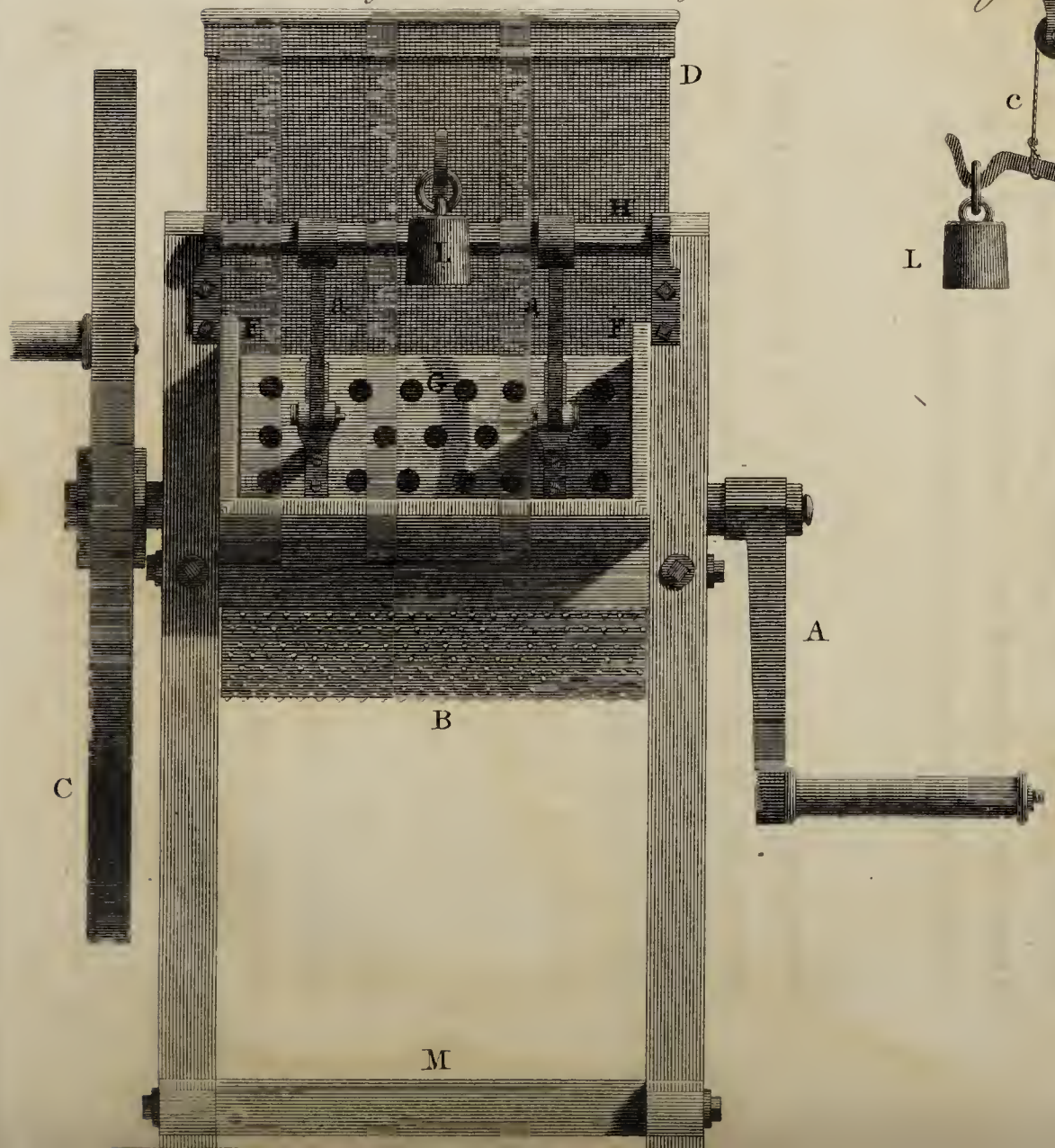
SIR,

IT is naturally the first object, and forms the primary duty of a well-regulated State, to provide its members with a sufficient quantity of good food. The greater are the advantages, and the more independant is the situation of that country, which can furnish within itself a full and ample supply of the means of subsistence to its inhabitants. We have long ceased in this country to feel the benefits arising from such a state of independence, and we have during the last ten or fifteen years, incurred a very large expenditure in the purchase of foreign corn. This subject has engaged much of my attention, and I have endeavoured to devise a plan by which the agriculture of this country may be improved, a great expenditure saved, and a considerable reduction of prices effected by the introduction into bread of an article of known nutritious properties derived from the potatoe. This substance is the farina or flour of that valuable root, which I have tried with advantage to a very great extent, having previously

gone

Mr. Whateley's Machine for grinding down the pulp of Potatoes.

Fig. 1.



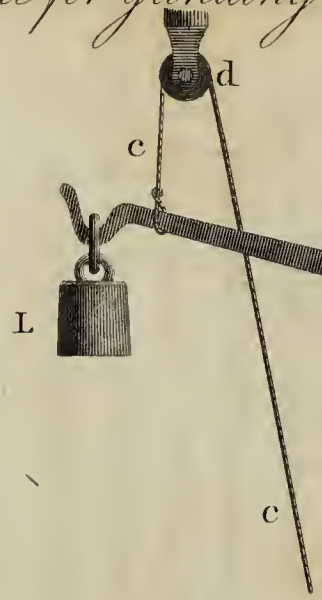
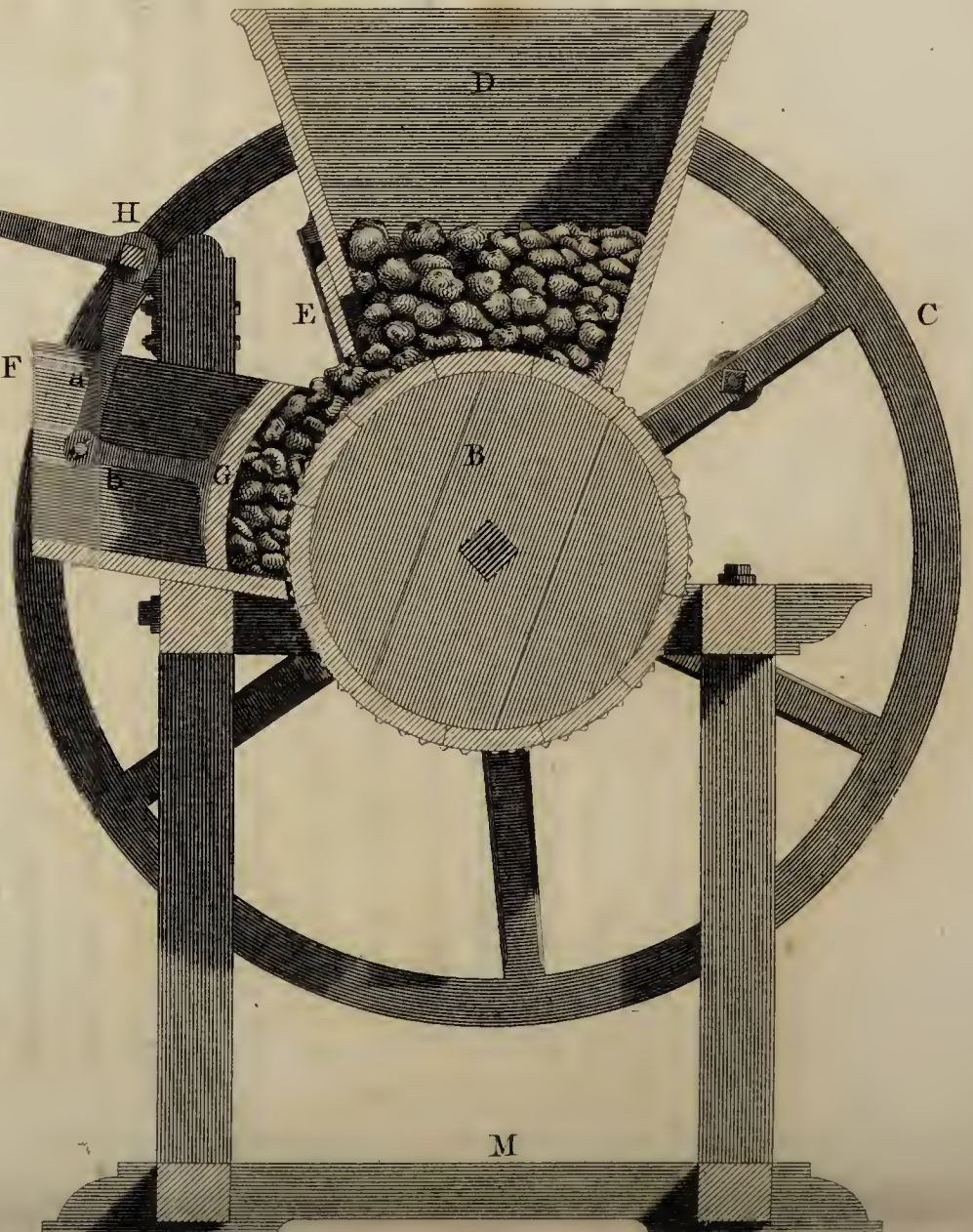


Fig. 2.



gone through a long course of experiments on making bread, biscuit, and pastry, from mixtures of raw potatoes, and boiled potatoes and farina, with different proportions of flour, &c.

It is well known that poor light soils, unfit for the culture of wheat, and from which only crops of barley or oats have been produced, and of which in many situations there are large tracts of land altogether uncultivated, will produce potatoes of excellent quality; two circumstances have however hitherto prevented their culture to the desirable extent, namely, the great expense of their carriage in a raw state from the interior parts of the country to a proper market, and their not keeping well more than six months after the crop is gathered.

These inconveniences I have obviated by the invention of a machine which is now at the Society's house, by which one individual can grind down fifteen hundred weight or seventeen hundred pounds nett of potatoes, into soft pulp in one day, yielding about two hundred weight of farina or flour when dried.

By calculation the power of a single horse will be equal to the grinding of twenty two tons of potatoes per week; the machine is capable of being applied to any power required. The farina or flour has been known to keep good seventeen years, and it may be afforded so as to yield a fair profit to the farmer, and the manufacturer at three pence per pound. The present price of wheaten flour is about five pence farthing.

It would be tedious now to enter into a long detail of this business by letter, but my son is in London, and if he is permitted to attend a Committee of the Society, and to give proofs of the trials I have made, by exhibiting specimens of the bread, flour and biscuits, and by fur-

nishing such other particulars as may be required, I trust they will perceive the great benefits that may result from this article, and particularly if my communications should merit the sanction of the Society, and be honored with their approbation.

I remain, Sir,

Your most obedient humble Servant,

JOHN WHATELY.

Cork, April 19th, 1813.

To C. Taylor, M. D. Sec:

Remarks from Mr. Whately, on Potatoes.

It may not be generally known, but it is capable of the most satisfactory proof, that the same quantity of land will yield above one half more of farina or flour where potatoes are cultivated, than if the same land was applied to the production of flour from wheat.

I have proved from experiment, that 2619 pounds of pure farina or flour may be produced from an acre of land planted with potatoes, and only 1660 pounds of flour from an acre of wheat. It will therefore be obvious, that, if we can apply this great excess to the same purposes as the flour of wheat, the advantages arising from it will be of the highest importance to the community. We now require from foreign countries about 500,000 quarters of wheat annually, for which we incur an expenditure of about two millions sterling, in ordinary years, and which has increased in years of scarcity to upwards of seven millions sterling, and there seems no probability that

that under the continuance of the present system of cultivation, we shall ever arrive at the period, when we can supply our own wants, and feel independant of foreign aid, for one of the first articles of subsistence.

We have had, for the last ten years, not only a course of favourable seasons, but the farmer has had, in the greater part of that period, the benefit of high prices to stimulate his exertions to the greatest possible production of corn, and if they have failed under such favourable circumstances to satisfy our wants, what evil may we not expect if the seasons should prove unpropitious, and the inconveniences of our situation aggravated by scarcity? I admit, that the prospect of supplies from foreign countries may be great, but we should recollect, that only a few months have elapsed, since the ports of Europe and America were shut against us, or only open on a system of licence, and that, in a situation of dependance, which, no well-wisher to his country can be desirous to see recur, nor, the possibility of which he will not feel anxious to prevent;—This, then, is one of the advantages which will attend the consumption of potatoe flour in bread, the earth yields it so much more abundantly, that the very first years cultivation of potatoes for that purpose, to the extent of only 25,000 acres, would relieve us from the necessity of any foreign importation, and instead of importing, we should speedily become an exporting country. Potatoes are found to possess such highly nutritive properties, that it seems hardly necessary to enter upon that subject:—They constitute, it is well known, in their natural state, the principal food of the Irish, and they are daily forming a great part of our own. This farina or flour, which contains the substantial nourishing properties of the root deprived of its watery particles, cannot but be highly

highly nutritious;—the use of it therefore in bread, is not likely to be the subject of dispute, provided it is in that state palatable, and can be afforded at a price not exceeding the price of wheaten flour:—That it possesses the first mentioned property, I have only to refer to the bread produced to the Society, containing different proportions of this flour, any, and all of which, will, I believe, be found as wholesome and agreeable as bread made wholly of wheaten flour; in some respects it seems an improvement, as it keeps much longer, and it rises and becomes very light and agreeable when toasted. Upon the second question, I shall be able to shew satisfactorily, that the flour of potatoes can be produced at a cheaper price than the flour of wheat, all objection, therefore, to its use in bread, is not only removed, but I conceive the most important advantages will flow from its adoption. In the specimens before you, one fifth of the farina is the smallest proportion made use of, and two thirds of farina and boiled potatoes together, when in bread, the largest; calculating, however, that no greater proportion than one fifth should be generally introduced, the saving of wheaten flour alone from that circumstance, would be immense. The population of Great Britain consists, according to the latest returns, of upwards of twelve millions and a half, and of this number, it may be conjectured, that, about ten millions consume wheaten bread; each individual's consumption has been considered equal to a quarter of wheat per annum: the introduction of potatoe flour, therefore, generally, would produce a saving of two millions of quarters of wheat per annum, and instead of being, as we now are, an importing nation, we should, after supplying our present deficiency, have a surplus of about 1,500,000 quarters for exportation, which, at the present permitted

export

export price, under 54s. per qr. would be equal in value to four millions sterling! That this surplus would not be obtained without some sacrifice of other crops, I am ready to admit; but when the increased productiveness of the potatoe is considered, when it is calculated, that large tracts of land may be cultivated upon this system, that would not be cultivated upon any other, and that the plan may be generally adopted, which prevails universally in Ireland, and has the recommendation of distinguished agriculturists in this country, of making the potatoe crop precede the crop of wheat, the sacrifices would, upon the whole, be few, and the advantages immense. I know that objections exist, from the scarcity of manure, &c; but I am satisfied that many of them would yield in practice:—The poor Irish contrive to manure the land, and to produce crops that serve to form the winter supply of the city of Dublin, in situations distant from cities, and where artificial manure is not to be had;—lime, sand, sea-weed, are all excellent, and are in many places easily procured; the burning of the surface in rough uncultivated land, is almost sure to produce a large crop, and is generally one of the first, as it is found one of the best preparatives to cultivation: the manure from hogs has been stated to afford very great returns, and, as it is almost essential to the economical pursuit of the business of manufacturing the potatoes into flour, that many hogs should be kept, for the purpose of consuming the skins, refuse, &c. it is a manure that would be abundant in those places, where the manufacture was introduced. Perhaps no situations would so strongly feel the benefit of this system, as those which are remote from sea-ports, and distant from water-carriage: The ground is now necessarily employed in pasture, or it remains waste.

The

The expense of carriage is an insurmountable bar to the pursuit of agriculture. But let us now consider the situation of a farmer adopting this system; he chuses a remote part of the country, where, perhaps, cultivation did not before exist;—he takes the land, at probably one-fifth part of the rent which he would pay in more frequented spots, and, he either invites the manufacturer of the farina to settle along with him, or he resolves to become a manufacturer himself: the first year, he begins by burning and paring the surface of a part of his land, and by this preparation insures an abundant crop—He sows, the next year, barley or oats on the land, thus cleaned and prepared, which will serve as food for his cattle, and for the large stock of hogs, that, as a manufacturer of farina he must support; and he proceeds to bring a further part of his land under cultivation by the same means—The potatoes are manufactured on the farm, and if he could afford to send the potatoes seven miles to market, in their original state, he can, without disadvantage to himself, convey them fifty in their manufactured state, as they are then reduced to about one-seventh or eighth part of their bulk. His hogs supply him with such a considerable quantity of manure, in addition to that of his farm yard, as will enable him to maintain a constant rotation of potatoe and light corn crops:—His expense in machinery is small, and the waggon that carries his flour to market, brings back his coals, his groceries, and his household requisites, without additional expense. It would be necessary for him to have a considerable number of labourers, and it would be his interest to attract them around him, by allowing them a small portion of land; and by being himself the purchaser of their superfluous produce, he would speedily raise a colony about him, and

as

as the source which gave it life is connected with our subsistence, and the just necessities of our nature, coeval with our wants, its prosperity must be ensured so long as we continue in the disposition to supply them. In the general complaint of the scarcity of farms, and the high rents which lands at present bear, perhaps no speculation offers stronger inducements to the young farmer, who can command a moderate capital, and who is contented to forego some of the gratifications of a large society. If he possesses activity and enterprize, and has engaged his land upon the favourable terms upon which it ought to be had at a distance from market, his success, in a few years, will be certain, provided the system meets with support from the public.

One of its many advantages consists in the incorruptibility of the farina; it is not like the flour of wheat, liable to decay, but it may be preserved for years, sound and good, perhaps improved, but certainly uninjured by age. Thus, our supply will be at all times rendered more equal, and the year of abundance will more effectually contribute to alleviate the year of scarcity:—scarcities themselves are likely to be of less frequent occurrence, as we should have the advantage of two essential crops instead of one; and the weather injurious to wheat, is not unfrequently favourable to the crop of potatoes, and vice versa. I must also observe, that the farina forms an excellent ingredient in sea-biscuit, in the proportions of two parts of farina to three of wheaten flour, or even of three parts farina to four of wheaten flour: a composition of this sort is more likely to resist the effects of climate, from the incorruptible property already mentioned, than if the biscuits were wholly made of wheaten flour.

Such are some of the more leading advantages likely to be

be produced by the proposed introduction of the flour of potatoes into bread, and the change of system to which it would give rise. We are now perhaps on the eve of another alteration in the Corn Laws, calculated to render the present high prices perpetual. A Committee is sitting upon them, composed of men of landed property, and I have heard, that it is in contemplation to prevent the importation of foreign wheat, when the price of British wheat is under 96*s.* per quarter. This, then, is peculiarly the moment to introduce an alteration in the system, which would render such a measure unnecessary, and which, instead of perpetuating high prices, would produce amongst us all the blessings of plenty. They may be summed up in these words,—We shall have a greater regularity, and a certain reduction of price; an immense increase of consumable food; its more equal distribution through years of scarcity, and years of plenty;

A consequent diminution of the Poors' Rates;

An increase of comforts to the poor, and to all classes of Society, and a great accession to our resources in every branch of national wealth.

J. WHATELY.

April 29th, 1813.

Experiments

Experiments on Bread.

1st *Experiment.*

No.	Weight lb.	oz.	Materials.	Pr. d.	Amount. s.	d.	Weight of Bread. lb.	oz.	Cost. Per lb. d.	Observations.
1.	2	8	Flour	$5\frac{1}{4}$	1	$1\frac{1}{8}$	3	6	$3\frac{7}{8}$	Good bread.
2.	2	0	Flour	$5\frac{1}{4}$	0	$10\frac{1}{2}$	2	11	$3\frac{7}{8}$	The same.
3.	1	8	Flour	$5\frac{1}{4}$	0	$7\frac{7}{8}$				
	1	0	Farina	3	0	3				
	2	8			0	$10\frac{7}{8}$	3	4	$3\frac{3}{8}$	Raw potatoe flavour.
4.	2	0	Flour	$5\frac{1}{4}$	0	$10\frac{1}{2}$				
	1	0	Farina	3	0	3				
	3	0			1	$1\frac{1}{2}$	3	13	$3\frac{1}{2}$	The same.
5.	1	8	Flour	$5\frac{1}{4}$	0	$7\frac{7}{8}$				
	2	0	Farina	3	0	6				
	2	0	Boiled Pota.	$\frac{1}{2}$	0	1				
	5	8			1	$2\frac{7}{8}$	5	7	$2\frac{3}{4}$	Slight flavour of the raw potatoe; crust soft.
6.	1	8	Flour	$5\frac{1}{4}$	0	$7\frac{7}{8}$				
	1	0	Boiled Pota.	$\frac{1}{2}$	0	$0\frac{1}{2}$				
	2	8			0	$8\frac{3}{8}$	2	9	$3\frac{1}{4}$	Well tasted bread; moist.
7.	2	0	Flour	$5\frac{1}{4}$	0	$10\frac{1}{2}$				
	1	0	Boiled Pota.	$\frac{1}{2}$	0	$0\frac{1}{2}$				
	3	0			0	11	3	0	$3\frac{5}{8}$	The same.
8.	1	0	Flour	$5\frac{1}{4}$	0	$5\frac{1}{4}$				
	1	0	Farina	3	0	3				
	1	0	Boiled Pota.	$\frac{1}{2}$	0	$0\frac{1}{2}$				
	3	0			0	$8\frac{3}{4}$	3	2	$2\frac{3}{4}$	Excellent bread; I consider it fully as satisfying as bread made wholly of wheaten flour.
9.	1	0	Flour	$5\frac{1}{4}$	0	$5\frac{1}{4}$				
	1	0	Boiled Pota.	$\frac{1}{2}$	0	$0\frac{1}{2}$				
	2	0			0	$5\frac{3}{4}$	1	13	$3\frac{1}{8}$	Baked heavy, but very sweet bread; moist.

2nd

2nd Experiment.

No.	Weight lb.	oz.	Materials.	Pr. d.	Amount. s.	d.	Weight of Bread. lb.	oz.	Cost. Per lb. d.	Observations.
1.	2	0	Flour,	5¼	0	10½				
	1	0	Boiled Pota.	½	0	0½				
	3	0			0	11	2	15½	3¾	Baked heavy, but not unpleasant bread.
2.	1	8	Flour	5¼	0	7⅞				
	2	0	Farina	3	0	6				
	2	0	Boiled Pota.	½	0	1				
	5	8			1	2⅞	5	6	2¾	Baked heavy; indifferent Bread.
3.	2	0	Flour	5¼	0	10½				
	2	0	Farina	3	0	6				
	2	0	Boiled Pota.	½	0	1				
	6	0			1	5½	6	0	2⅞	Excellent bread; improved by being kept a few days, rather overbaked.
4.	1	8	Flour	5¼	0	7⅞				
	1	0	Farina	3	0	3				
	1	0	Boiled Pota.	½	0	0½				
	3	8			0	11⅜	3	5	3½	This proportion is perhaps superior to the last, but the bread of both is excellent; improved by being kept a few days.
5.	1	0	Flour	5¼	0	5¼				
	1	0	Farina	3	0	3				
	1	8	Boiled Pota.	½	0	0¾				
	3	8			0	9	3	3	2⅞	Rather too moist, but very sweet and good, and much improved by keeping.
6.	1	0	Flour	5¼	0	5¼				
	1	0	Rasped Pot.	½	0	0½				
	2	0			0	5¾	1	12	3¼	Light pleasant bread; dark coloured.

3d Experiment.

1.	2	0	Flour	5¼	0	10½				
	2	0	Farina	3	0	6				
	2	0	Rasped Pot.	0½	0	1				
	6	0			1	5½	6	2	2⅞	Heavy; discoloured; made from potatoes rasped 48 hours; flavor not pleasant.

3d Experiment—(Continued)

No.	Weight lb.	Weight oz.	Materials.	Pr. d.	Amount s.	Amount d.	Weight of Bread lb.	Weight of Bread oz.	Cost. Per lb. d.	Observations.
2.	2	0	Flour	$5\frac{1}{4}$	0	$10\frac{1}{2}$				
	2	0	Farina	3	0	6				
	2	0	Boiled Pota.	$\frac{1}{2}$	0	1				
	6	0			1	$5\frac{1}{2}$	6	1	$2\frac{7}{8}$	Heavy.
3.	1	8	Flour	$5\frac{1}{4}$	0	$7\frac{7}{8}$				
	1	0	Farina	3	0	3				
	1	0	Rasped Pot.	$\frac{1}{2}$	0	$0\frac{1}{2}$				
	3	8			0	$11\frac{3}{8}$	3	9	$3\frac{1}{4}$	Rather heavy: discoloured; the boiled potatoes are evidently a more desirable ingredient than the rasped.
4.	1	8	Flour	$5\frac{1}{4}$	0	$7\frac{7}{8}$				
	1	0	Farina	4	0	3				
	1	0	Boiled Pota.	$\frac{1}{2}$	0	$0\frac{1}{2}$				
	3	8			0	$11\frac{3}{8}$	3	5	$3\frac{1}{2}$	Good bread; toasts extremely well: indeed all bread made of a proportion of potatoe is remarkably good toasted.
5.	2	0	Flour	$5\frac{1}{4}$	0	$10\frac{1}{2}$				
	1	0	Farina	3	0	3				
	1	0	Rasped Pot.	$\frac{1}{2}$	0	$0\frac{1}{2}$				
	4	0			1	2	4	0	$3\frac{1}{2}$	Rather heavy; discoloured; flavour not good.
6.	2	0	Flour	$5\frac{1}{4}$	0	$10\frac{1}{2}$				
	1	0	Farina	3	0	3				
	1	0	Boiled Pota.	$\frac{1}{2}$	0	$0\frac{1}{2}$				
	4	0			1	2	4	0	$3\frac{1}{2}$	Excellent bread; superior in colour to No. 4, and rather more compact; this quantity of wheaten flour alone, as appears by No. 7, would have produced 2lb. 10oz. of bread; consequently, the actual proportion of the produce of the potatoe, in this loaf, is 11b. 6oz., or, as nearly as possible, one third.
7.	2	0	Flour	$5\frac{1}{4}$	0	$10\frac{1}{2}$	2	10	4	Rather dark; the appearance of this loaf indicated that the yeast used for this batch was not good.
8.	2	0	Flour	$5\frac{1}{4}$	0	$10\frac{1}{2}$	3	4	$3\frac{3}{4}$	Excellent bread; whiter than bread made of wheaten flour alone; no flavour whatever of potatoe; not used until 9 days old.
	0	8	Farina	3	0	$1\frac{1}{2}$				
	2	8			1	0				

3d Experiment—(Continued)

No.	Weight lb.	oz.	Materials.	Fr. d.	Amount. s.	d.	Weight of Bread. lb.	oz.	Cost. Per lb. d.	Observations.
9.	2	0	Flour	5¼	0	10½				
	0	8	Farina	3	0	1½				
	0	8	Rasped Pot.	½	0	0¼				
	3	0			1	0¼	3	7	3½	Not equal to No. 10, an additional proof that rasped potatoes are not desirable.
10	2	0	Flour	5¼	0	10½				
	0	8	Farina	3	0	1½				
	0	8	Boiled Pot.	½	0	0¼				
	3	0			1	0¼	3	5	3¾	Excellent bread; rises by toasting; and was quite fresh at 7 days old.

From these experiments, it appears that various proportions of potatoes and farina are highly palatable in bread; but if it be calculated that not more than one-fifth part be generally introduced into consumption, the operation of that fifth is sufficiently great to produce all the effects in view, in recommending its general adoption.

Some kinds of potatoes contain a much greater proportion of farina than others, some yielding a seventh part, and even a still larger proportion of it. Experience will best determine the most desirable sort for use, as other kinds produce more abundantly in number, all these considerations should be attended to.

Potatoes may be manufactured into farina during the greater part of the year, but they lose a portion of their farinaceous matter when vegetation begins; the manufacturer, therefore, should provide an early sort to commence his operations upon in August, and cease to grind any after the months of April and May.

Frost-bitten potatoes yield nearly as good farina as the others, provided they are ground before they begin to decay; and potatoes kept over for a whole season, although of inferior value, may, by this process, be still rendered ser-

serviceable food for mankind. These are advantages which ought not to escape notice. Frost-bitten potatoes have hitherto become in a short time a total loss, and farmers have generally been afraid of extending their cultivation of potatoes, for fear of their being spoiled by keeping, both which inconveniences are avoided by preparing the farina from them.

Amongst the many important uses to which the farina may be applied, that of biscuit for sea store is of great consequence. Biscuits made from one part farina and two parts of wheaten flour, are whiter and better than those made wholly of common flour. Baked biscuits of these proportions have been repeatedly made with uniform success, and as the farina is in itself less corruptible than wheaten flour, it is likely to produce a biscuit of a less perishable kind. Some have been already kept nearly twelve months without exhibiting any symptoms of moisture or decay; on the contrary, they were as hard and as good as on the day they were baked. Biscuit differs from leavened bread in this circumstance, that all moisture is evaporated from biscuits in baking, whilst it constitutes an essential quality in bread, the weight of bread is greater, the weight of biscuit is less than the flour of which it is composed; it is therefore not inconsistent with the nature of farina that it should exhibit more moisture in bread, and yet discover no symptom of it in biscuit; and it has one convenient property, of which a baker, who manufactures it, may avail himself, that it may be used for bread or biscuit either in a wet or dry state, consequently the expense of drying it may in some cases be avoided. Its introduction into biscuit would produce a saving of one-third of the wheaten flour now used for that purpose, which will be found very great, when the extensive use of biscuit in the navy and army is consi-

dered. The farina of potatoes should constitute, from its general application, a part of the stores of each.

In the navy particularly, the farina would afford a great variety of food, as it forms an excellent ingredient in soup as a substitute for pease, oatmeal, and rice, and possesses the superior advantage over those substances, of not being susceptible of injury. One ounce of farina will thicken sufficiently nearly one quart of water: and when this soup is flavoured with onions, cellery, leeks, &c. and seasoned with pepper and salt, it forms a very palatable mixture without the aid of meat. The produce of twenty-one pounds of raw potatoes made into farina, and soup formed from it, will furnish a wholesome meal to twenty-eight persons, allowing each person a full quart, which potatoes, in their original state, would scarcely furnish a dinner to one-third of that number.

The farina of potatoes will form a thick mucilage, with twenty-six times its weight of water.

In all cases where the farina is intended to be converted into a gelatinous state, the farina should be previously mixed with some portion of the liquid cold.

A desert spoonful of the farina mixed with a little cold milk and salt, and added to a pint of boiling milk, and kept stirring and simmering, will form an excellent nutriment.

From various circumstances, it appears that the article called Semolina in the shops, and recommended as a nutritious diet for children and sick persons, is wholly composed of the farina of potatoes.

Certificates.

Mr. Whately, of Cork, has shewn me a specimen of flour made from potatoes; and also of biscuit, made partly from

from this flour and partly from the flour of wheat. I am convinced that this flour is very wholesome and very nourishing, and may be of great use to the public in supplying the deficiency of wheaten flour.

M. Baillie, M. D.

Lower Grosvenor-street,
Dec. 11, 1812.

I have examined the flour from potatoes, made by Mr. John Whately, and have no doubt of its containing all the nutritious part of the potatoe, and therefore calculated to form a very good and valuable diet; and as the flour thus produced may be readily transported to any distance, and may be kept for a very long time without losing any of its nutritive properties, I think the conversion of potatoes into flour may prove highly advantageous to the community.

Geo. L. Tuthill.

Soho-square,
Jan. 17, 1813.

Reference to the Engraving of Mr. Whately's Machine for grinding Potatoes. Plate 1. *Fig.* 1, 2.

This machine is of a very simple construction, its moving part consisting of a cylinder covered with tin plates, pierced with holes, so as to leave a rough surface, in the same manner as the graters used for nutmegs, &c. but the holes in this are larger. This cylinder is situated beneath a hopper, into which the potatoes are thrown, and thence admitted into a kind of trough, where they are forced against the cylinder, which, as it revolves, grinds the potatoes to a pulp.

Fig. 1. represents the machine in front, or lengthways of the cylinder; and fig. 2 is a section through the middle of it, shewing also the hopper with its contents, and the

manner of the action of the machine. A represents the handle, by which motion is given to the machine: it is fixed upon the end of the axis of the grating cylinder B, on the opposite extremity of this axis is a fly-wheel C, to regulate and equalize the movement; D is the hopper, into which the potatoes are put, and pressing by their weight upon the top of the cylinder, as it it revolves, they are in part grated away. On one side of the lower part of the hopper is an opening, closed or opened more or less at pleasure by a slider E, and the degree of opening which this has regulates the passage of the potatoes from the hopper D into the trough F; this is as wide as the length of the cylinder, and has a concave board G fitted into it, which slides backwards and forwards, by the action of levers *a a* affixed to an axis H, extended across the frame of the machine; K is a lever fixed upon the middle of this axis, and terminating in a hook at the end for the suspension of a weight L; this acts upon the board G by means of the levers K and *a a* and the rods *b*, to force or press the potatoes contained in the trough forwards against the cylinder, and complete the grating of them into a pulp.

A line *c* is tied to the end of the lever K, and passing over a pulley *d*, hangs down within reach of the person who turns the handle of the machine; by drawing this line, the weight at the end of the lever K is raised up, and by the rods *b*, the board G is withdrawn to the extremity of the trough, and a fresh stock of potatoes falls out at the opening E from the hopper into the trough; then the line being let go, the weight L presses the board against the potatoes, and forces them against the cylinder, which by its motion grates them away very rapidly, the pulp passing down the space between the edge of the lower board of the trough F, and the cylinder, which space

is

is only a narrow crevice that nothing may pass down but the reduced pulp, which falls into a box or vessel situated between the frame at M. The board G is perforated with a number of large circular holes, to make an uneven surface, in which the potatoes remain steady, whilst exposed to the action of the cylinder upon their opposite sides.

The tin plate covering the cylinder, is, of course, pierced from the inside outwards, and the bur, or rough edge, left round each, forms an excellent rasping surface, for the reduction of such substances as the present. The frame of the machine requires but little explanation, merely consisting of a square frame, containing the cylinder, and supporting the hopper. This frame stands on four legs, two of which rise up to a sufficient height to carry the pivot of the axis H. The legs are morticed into four ground-sells, which may be made to receive a box or chest, fitted in the manner of a drawer to contain the pulp as it falls from the machine, or it may fall into any vessel placed underneath.

The pulp in the vessels in which it is collected should be completely immersed in water, and well stirred, the separation of the farina, by its falling to the bottom, will speedily take place. The fibrous and refuse parts should be first removed, and the farina afterwards repeatedly washed, until it no longer communicates any tinge to the water: it is then sent to the stove or drying apartment, put into boxes, and dried. Care should, however, be taken, that it does not dry too rapidly. Wherever the business is conducted upon a large scale, a machine for washing the potatoes* should be erected, and it might be con-

* Models of two machines proper for washing the earth from potatoes, may be seen in the Society's Repository.

trived to receive motion from the power that directs the grinding machine. The vessels containing the pulp should be so arranged, that a stream of water could be made to pass through them at pleasure. The pulp, after the first separation of the farina still retains a quantity of farinaceous matter; but it will perhaps be more profitable to convert it into food for hogs, with such other additions as may be thought necessary, then to steep it again for the purpose of extracting any remaining portion of farina. It will be probably best to give it to the hogs boiled, along with a moderate proportion of boiled potatoes. This disposal of the refuse pulp would nearly defray the whole expense attendant upon the manufacture of the farina.

*** This machine would operate with good effect for reducing apples to a pulp for making cyder, as it is extremely expeditious and effectual in its operation.

The LESSER GOLD MEDAL *of the Society was this Session voted to Mr.* LEONARD PHILLIPPS, *Jun. of the Portsmouth Road, near Vauxhall Turnpike, for Planting upwards of Five Thousand Sorts of hardy Fruit Trees. The following Communications were received from him.*

SIR,

IT will probably be unnecessary for me to enter into a long detail upon the great advantages derivable to this kingdom, from attention to the various fruits it produces, or is capable of producing, particularly the varieties of apples and pears. A reference to the different volumes of the Transactions of the Society of Arts, will shew, that the planting of orchards and improvements of fruit have been long thought deserving of the highest honorary rewards of the Society.

Though

Though sensible of the many difficulties I should have to encounter, yet, I have not been deterred from the attempt of bringing into one point of view, the different varieties of fruit, congenial to this climate, which could be procured from every part of the world to which I could get access, in order to form an establishment, where the public might have an opportunity of viewing all these fruit trees in growth, and, which I have actually so far accomplished, as to have at present above five thousand sorts of fruit trees, in full bearing, at the proper season, in the neighbourhood of Vauxhall.

Much confusion has arisen among horticulturists, from the same kind of apple or pear having different names in different counties. Purchasers of fruit trees have met with great disappointments, in having one sort of apple tree imposed upon them for another, and have hitherto had no means of pleasing their eye or taste, by an opportunity from a morning's walk, to confirm their judgment from actual inspection and comparison.

Many persons are in possession of good fruit trees, of which they do not know the name, or from what quarter similar trees can be procured. A comparison of their fruit with my extensive varieties of trees, will remove that difficulty, and be the means of making the language of the orchardist, clear and general.

I have minuted the original provincial names of the trees I have obtained, and the Horticultural Society of London have appointed a committee, to meet frequently, during the proper season, to examine the different fruits, and to decide upon the proper name to be given to each variety, and thus to form a standard appellation to be generally adopted.

I had the honor, (last autumn), of producing at the Society's

Society's rooms, specimens of above eighty different kinds of apples, with their names, as a sample of the nature of my undertaking, and if I meet with the approbation of the Society, I shall feel a pleasure in annually laying before them, accounts and specimens of the progress I make.

Few can appreciate the difficulties I have encountered in forming my establishment, besides the great expense; and, if I shall be thought deserving of a distinguished mark of honor from the Society, it would be a great stimulus to my further exertion, and might materially encourage the growth of fruit, a branch which, if, by the Society's patronage it should engage the public attention, may be productive of general advantage.

I will furnish the Society, if deemed requisite, with certificates, from competent persons, who have inspected my orchard, and who are convinced of its great utility.

I am, Sir,

Your humble Servant,

LEONARD PHILLIPPS, Jun.

Portsmouth-road, ¼ Mile beyond Vauxhall turnpike,
March 22nd, 1813.

To C. Taylor, M. D. Sec.

Certificates were received from Mr. Robert Culverwell; Mr. Richard Jackson, Belmont Cottage, Wandsworth road; Mr. J. Humble; Mr. James Stonehouse; Mr. John Wisker, and Mess. Chandler and Buckingham, nursery-men, Vauxhall; stating, that they have seen Mr. Leonard Phillipps's plantation of fruit trees, that the trees are in a flourishing state, the varieties very numerous, and collected with much pains

pains and expense, and that they believe this arduous undertaking will be of very great utility to the public.

In Nov. 1813, Mr. Phillipps exhibited to the Society specimens of more than two hundred varieties of apples and pears, produced in his orchard; he noticed its very favourable, and improved state, and mentioned that persons might depend upon being supplied from him with the real kinds of fruit-trees desired.

*** The Society of Arts, &c. would be much obliged to such persons, as have valuable kinds of hardy fruit trees, to furnish them with grafts thereof, at the proper season, with a view to extend their propagation to various parts of the kingdom.

The GOLD MEDAL, *the Premium offered in Class* 10, *for planting the greatest Number of Larches, was this Session adjudged to Mr.* WILLIAM BACKHOUSE, *of Shull House, near Wolsingham, Durham, for planting* 300,000 *Larches, and* 50,000 *other Timber Trees. The following Communication was received from him.*

To the Society for the Encouragement of Arts, Manufactures, and Commerce, Adelphi, London.

GENTLEMEN,

As a candidate for the premium offered for the inclosing and planting the greatest number of acres of land, incapable of being ploughed, in the winter of 1809—10, I here inclose certificates of the plantations I have made, at Shull, near Wolsingham, in the period prescribed by you. They are, with little exception, on the sides of steep hills, in some places rocky, and altogether unfit for cultivation:

tivation;—the land is very barren, the surface, generally a thin peat, covering a stratum of sand, or sandy clay, the latter of which prevails over the greater part of the estate. Under this earth, broken yellow sand-stone, from one foot to a yard or two, in depth, keeps the land remarkably dry; and it appears a soil well suited for the cultivation of larch. The ling was first burnt off the land, which was all holed, and the holes made at least six months before the trees were planted, which appeared to assist them considerably the first year, as the soil had, by exposure to the air, become fine and mellow, and in good condition to receive the plants; the holes were from 9 to 12 inches diameter, and on an average 9 inches deep: the plants had been one year transplanted, and were from 10 to 18 inches high when set, the spruce firs excepted, which had been two years transplanted. The larches are now from 2 to 3½ feet high, and growing remarkably well.

The estate is distinct, although adjoining to one of the same name, planted by my brother, Jonathan Backhouse, Jun.

WILLIAM BACKHOUSE.

Total number of forest-trees planted by me, Three hundred and fifty thousand; (particulars, as under) planted on about one hundred and thirty one acres.

2500 larches per acre;
400 scotch, and spruce fir, and oak, per acre,

2900 trees, per acre.

CERTIFICATES.

I hereby certify, that I have superintended the inclosing and planting of one hundred and thirty acres of land,

land, *incapable* of being ploughed, from its being too hilly and rocky, and of a soil too barren to repay the expense of tillage, on the estate of Wm. Backhouse, at Shull, in the parish of Bedbourn, and for his account. The said plantations are effectually inclosed and secured, and in a thriving condition, being from 2 feet to 3½ feet in heighth, and containing three hundred and fifty thousand forest trees.

Witness my hand this 14th day of December, 1812,

JAMES THOMPSON.

Total.	*The Particulars.*
300,000 - -	2,500 larches, per acre.
50,000 - -	400 of Scotch and spruce fir, and oak, and a few birch and alder in bogs.
350,000 - -	2,900 per acre.

JOHN ATKINSON.

I have surveyed the estate within mentioned, which has been completely planted with larches, oak, spruce, and Scotch fir, birches, alders, &c. at the distance of five feet by three;—and the plants are in a thriving condition, the whole well-fenced, and the soil and situation render it incapable of being otherwise useful.

As witness my hand, this 12th day of December, 1812,

EDWARD CHARLTON;
West Auckland.

131 A. 0 R. 20 P.

Witness,
JOHN ATKINSON.

I have

I have looked over the within mentioned plantations at Shull, and am of opinion, the ground is so barren as not to repay the expense of tillage, and that the within statement is correct, the fences being in good order, and the trees growing vigourously *at this time.*

Witness my hand, this 15th day of 12th month, 1812,

GEORGE COATES,

Land-agent to David Bevan, Esq.

Banker, Lombard Street.

The SILVER MEDAL, *the Premium offered in Class* II, *for Planting Larches, was this Session adjudged to Mr.* JONATHAN BACKHOUSE, *Jun. of Darlington, Durham, for planting* 271,000 *Larches, and from whom the following Communications were received.*

As a candidate for the premium offered by you for the planting the greatest number of larches in the winter 1809—10, I enclose certificates of plantations made by me within the period prescribed, at Shull, in the parish of Bedburn, where I have planted, 168,300 larches, and, at Sheep Walk, (Lanchester,) where, 102,800 larches have been planted, making, in the whole, *two hundred and seventy-one thousand one hundred larches,* planted by me, in the course of that season. These plantations have been chiefly made upon lands, that have been inclosed about twenty years, but never cultivated, and were covered with ling or heath, about 20 acres of it had been in cultivation

vation at some period, but had been long abandoned, and, for many years, produced nothing but ling: about seven acres of it were in ploughing at the time that it was planted: I merely mention this to observe, that where the land had been in cultivation, (though, many years ago, that the trees have invariably grown with greater vigour, and are now about one foot higher than those planted on lands, which had never been broken up.—The nature of the soil, on both estates, is much the same, being chiefly a sand, or sandy clay, covered with about an inch of black peat earth, (where it had not been ploughed,) and the substratum, a sand stone. From experience I find, that larches do not thrive in peat earth, even when dry; or, where the surface only is peat, it retards their growth, but by ploughing it becomes mixed with other earths, and also drains the land more completely: the growth of the trees is, in consequence, much more uniformly healthy and vigorous, than on those soils which have never been broken up. At Shull, the land is generally hilly; at Sheep-walk, it is a gradual slope to the south east. Where the land is level, ploughing is more obviously beneficial, as it takes off the surface water, which I have always found to injure the growth of the larches: the trees were planted 3 feet by 5, 2500 larches per acre, and 400 of oak, spruce, and Scotch fir; the land was holed in the autumn, the surface of ling, &c. being first taken off with a paring spade, where the holes were made, excepting on the ploughed land, which was done more slightly.

I am, respectfully,

JON. BACKHOUSE, JUN.

Darlington, December 21st, 1812.

TO THE SOCIETY OF ARTS, &c.

The

The larches had been transplanted from the seed bed one year before they were set out, and were from 10 to 15 inches high; and I have invariably found, that trees of this age and size succeed the best.

This estate at Shull is distinct from, though adjoining the one planted by my brother, William Backhouse; that of Sheep-walk adjoins the estate of T. White, of Woodlands.

J. B. Jun.

Certificates.

I do hereby certify, that I have superintended the planting of one hundred and two thousand eight hundred larch trees on the property of Jonathan Backhouse, Jun. of Darlington, at Sheep-walk, in the parish of Lanchester, and county of Durham, by his order, and on his behalf, the said trees were all planted between the 24th of June, one thousand eight hundred and nine, and the 24th of June, one thousand eight hundred and ten, and cover nearly forty acres of land, not well calculated for husbandry: the said plantations are effectually fenced and secured, and the plants are in a most thriving condition, being from 2 feet to 3½ feet high.

Witness my hand, this 12th day of December, 1812,

Thomas Parker, his mark ⋊.

Witness, William Snowball.

I do

I do hereby certify, that I surveyed the within mentioned estate, which is completely planted with larches, (a few spruce firs excepted), at the distance of five feet by three feet from each other, and that the within report of their thriving condition, growth, and fences, is true.

Witness my hand, this 14th day of December, 1812,

EDWARD CHARLTON.
West Auckland.

Witness, JOHN ATKINSON.

I have looked over the within mentioned plantations, at Sheep-walk, and am satisfied, that the statement is correct, the fences being in good order, and the trees healthy, and growing well.

Witness my hand, this 11th day of December, 1812,

ROBERT HUNTER,
Agent for Thomas White, Esq. of Woodlands.

I have looked over the within mentioned plantations at Sheep-walk—I am satisfied that the statement is correct, the fences being now in good condition, and the trees growing with vigour.

Witness my hand, this 21st day of December, 1812,

GEORGE COATES.

The larches have grown, on an average, as under,

First year,	about	3 inches.
Second do.	-	6 to 12.
Third do.	-	9 to 18.

Shull House, December 14th, 1812,
near Wolsingham.

I do hereby certify, that I have superintended the planting of one hundred and sixty eight thousand three hundred larch trees, between the 24th of June, 1809, and the 24th of June, 1810, on behalf of Jonathan Backhouse, Jun. of Darlington, in the county of Durham, at Shull, in the parish of Redbourn, in the said county, on lands not calculated for the purposes of husbandry: the said plantations cover 67 acres of land, are effectually fenced and secured, and the plants are in a thriving condition, being about 2½ feet in height.

Witness my hand, this 14th day of December, 1812,

JAMES THOMPSON.

Witness, JOHN ATKINSON.

The Thanks of the Society were this Session voted to Mr. RICHARD GREEN, *No.* 8, *Lisle Street, Leicester Square, for his Present of Two Instruments for cutting or scooping out the Eyes of Potatoes for Sets or Plants. The following Communication was received from him, an explanatory Engraving is annexed, and the Instruments are preserved in the Society's Repository.*

GENTLEMEN,

I HAVE herewith submitted for your inspection, two machines, or instruments, for cutting potatoes, for sets, or seed, they are of a simple construction, differing a little from each other. Their advantages are ease and facility in cutting, and a certainty of the cuttings or sets being

of

Mr. G. Tuches's Moveable Scaffold.
for repairing the interior of a Dome &c.

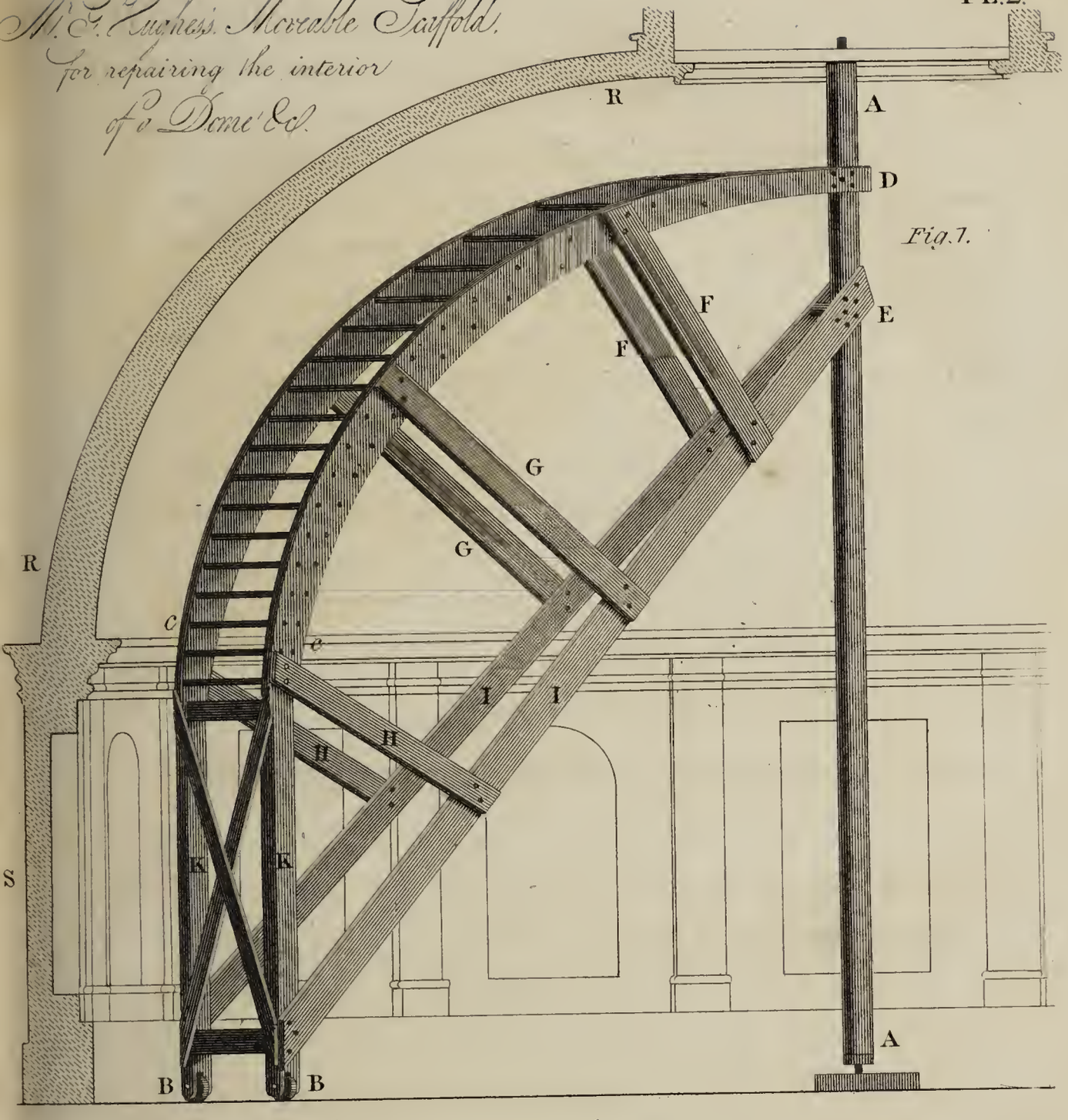
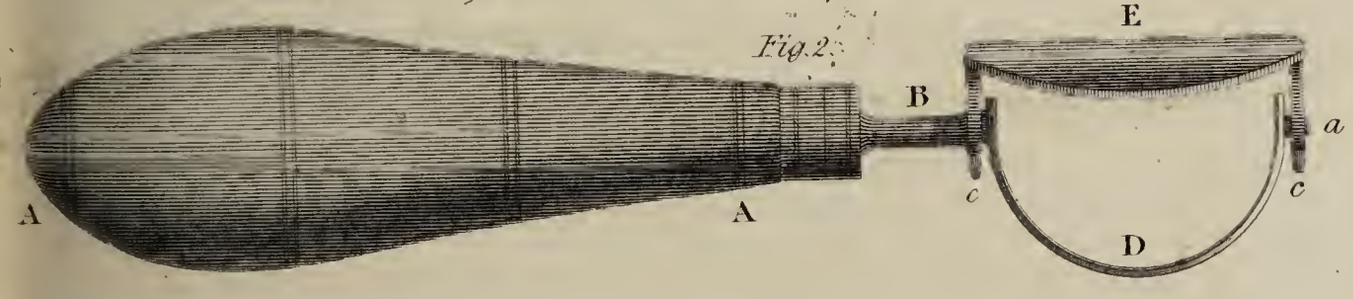


Fig.1.

Mr. Rich.d Green's Potatoe Scoops.

Fig.2.



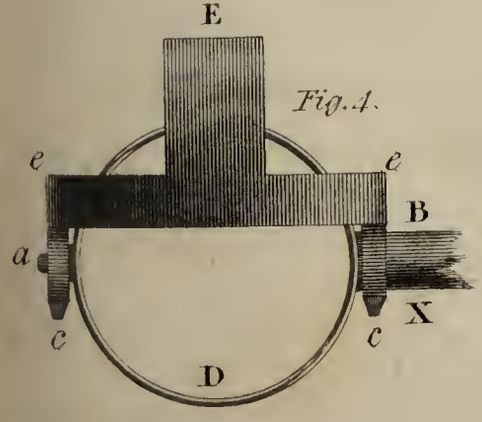
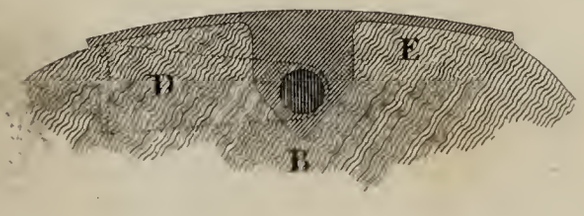


Fig.4.

Fig.3.



Drawn by J.Farey

Engraved by Jas. Davies

of a proper size, which is a matter I respectfully recommend to your notice.

The sets will be all about an inch in diameter, and can be planted by a bean-barrow, or drill-machine, with one third of the labour, and with more accuracy than by hand. A boy and one horse will be sufficient to plant with such sets an acre in a day.

I remain,
Gentlemen,
Your most obedient, humble Servant,

RICHARD GREEN,
Ironmonger.

No. 8, Lisle-street,
Leicester-square.

To the Society of Arts, &c.

Reference to the Engraving of Mr. Richard Green's Potatoe Scoops, Plate II.—*Fig.* 2. 3. 4.

A A, Fig. 2, represents the handle of the machine, nearly of its proper size, B the shank inserted into the handle united to the semicircular cutter or knife, D, which is sharp at both edges, and turns on pivots at B and *a* in E, a brass plate, which, by means of ears or projections from it downwards, at *c c*, allows the knife D, when a potatoe is held firm in the left hand, and the plate E pressed down hard upon it with the left thumb to cut from it a semicircular solid piece, or set, by turning the handle with the right hand, and forcing the knife through it in a semicircular direction.

Fig. 3, shows an end view of the brass plate, its ears, and steel cutter, supposed to have been pressed into a potatoe; D a section of the steel cutter, and B the end of one of the pivots on which the cutter turns.

Fig. 4 shows another machine, for the same purpose, in which X is part of the handle. D, the cutter, which is here a perfect circle. *e e*, a brass ring, in the lower projections from which the cutter turns upon pivots, at *a* B, making a complete revolution in turning round the handle. E, an arched brass-piece, rising from the brass ring *e e*, on which the pressure with the thumb of the left hand is to be made, as in the other instrument.

The only attention necessary in the use of either instrument is, to place it so upon the potatoe, that the eye, or part from whence the shoot springs, is nearly in the centre of the piece to be cut out to set.

The GOLD MEDAL, *the Premium offered in Class* 21, *was this Session adjudged to Mr.* EDWARD KNIGHT, *of Great Bardfield, Essex, for the growth of a Crop of Beans, and sowing Wheat on the same Land, the same Year, and thus preventing the necessity of a Fallow. The following Communication was received from him.*

To the Society for the Encouragement of Arts, Manufactures and Commerce.

ON perusing the Premiums offered by the Society, I observe one for the greatest number of acres of beans and wheat;—I beg leave, therefore, to mention, that in the beginning of 3d Mo. (March) 1812, I sowed fifteen acres of Beans, with a hand drill, about 7½ acres Tick beans, and

and the remainder with a small purple bean, and hoed the rows three times, and ploughed betwixt the rows, (being about two feet eight inches asunder), four times with a common foot plough, and two horses. Being a very wet season, I could not, as my common practice is, hoe the land after the beans got too high to plough, but when they reaped the beans, (from the 16th of 9 Mo. to 21st), I set up the shocks so as to plough between them, directly with a slice plough, and furrowed up with a common plough, being on four furrow ridges, and then moved the shocks of beans on the land so dressed, and worked the rest in the same manner; by which method, and harrowing up the weeds, I made my land in good order for wheat, which was sown the latter end of 10 Mo. (October,) 1812, and have now a good plant of wheat, by the before-mentioned method of sowing beans and ploughing betwixt the rows. In a good season I get my land as clean as a good summer fallow, and grow a fair average crop of beans; for our poor land, say four quarters per acre, but this year a poor crop of beans in general; I do not expect more than three quarters per acre, but I have not yet thrashed all my beans, when I have, I will give the quantity. The land is a wet heavy soil, not rich. I have hollow-drained it four times within about thirty years, twice with the spade, and twice with a Mole plough. A man will drill four acres in a day, before the ploughs, when it does well, and I sow two furrows on a ridge, or more, on a broad land; I fix the same drill behind a common plough, and drill either beans or pease very regular. The beans cost 3*s.* per acre hoeing, each time, and the ploughing 4*s.* each ploughing.

EDWARD KNIGHT.

Great Bardfield, 2 Mo. 22nd, 1813.

These are to certify, that our master, Edward Knight, sowed the fifteen acres of beans and wheat, and worked the land as before described.

Witness our hands this 22d of Feb. 1813.

John Shakeshaft,
Thomas Shakeshaft, his mark ×.

This is to certify, that the communication to the Society of Arts, &c. by Edward Knight, of Bluegate Hall, Great Bardfield, respecting his growth of beans, that 15 acres were sown with a hand-drill, and ploughed between four times, and hoed three times in the rows, in the spring, 1812, and that the same land is now sown with wheat, and is in good plant, is a true statement.

Witness Thomas Stebbing,
Thomas Pollett,
William Pollett.

Bardfield, April 14th, 1813.

The quantity or beans, per acre, cannot yet be ascertained, as they are not all thrashed.

TEN GUINEAS, *the Premium offered in Class 27, were this Session adjudged to Mr.* EDWARD KNIGHT, *of Great Bardfield, Essex, for Twenty-one Stocks of Bees, in his possession. The following Communication was received from him.*

To the Society for the Encouragement of Arts, Manufactures, and Commerce.

SEEING among the Premiums for this year, one for the greatest number of Hives or Boxes, stocked with Bees, I beg leave to inform the Society, agreeably to their offer, that I had, previous to the 21st of 8 Mo. (September,) 1812, twenty-one stocks of bees, which the undersigned have witnessed. Should I be so fortunate as to obtain the Society's Premium, I shall feel much obliged.

Your friend,

EDWARD KNIGHT.

Great Bardfield, Essex,
10 Mo. 10th, 1812.

WE, the undersigned, do hereby certify, that we have seen the 21 stocks of bees, in the possession of Edward Knight, as stated above, and that they have been in his possession during the summer.

JOHN SHAKESHAFT,
CHARLOTTE DAY.

OBSERVING, that it is expected, that the claimant should give such information as may occur respecting bees, I have one observation to make, viz. That I have found it better, after the month (called) June, when the bees lay out of the hive, and do not soon swarm, to make an addition to the hive, as, if they have room, they will not lay out nor swarm. This is done by working a piece of the same sort and size of the skip or hive, with a hoop on the top; then raise up the hive, and put this under, first putting some soft clay on the top of the piece, to make it air-tight;—by this way I might call my stocks twenty-three, having two double ones. Or, otherwise, I have put a box under the hive, with a hole cut in the top, near as large as the hive, and set the hive on it; by this method we took, from one hive, 45lbs. of honey, and 14½lbs. of wax.

EDWARD KNIGHT.

Great Bardfield, 10 *Mo.* 10*th*, 1812.

CERTIFICATES were received from Mr. THOMAS STEBBING, Mr. THOMAS POLLETT, and Mr. WILLIAM POLLETT, stating, that it appeared to them, from the testimony of John Shakeshaft, servant to Mr. Edward Knight, that the above statement is correct.

PAPERS

IN

CHEMISTRY.

The LESSER GOLD MEDAL *of the Society was this Session voted to* THOMAS WHITE, *Esq. of Woodlands, Durham, for his application of Larch Bark, to answer all the purposes of Oak Bark, in Tanning Leather. The following Communications were received from him, and the several Specimens of Leather, so tanned, are preserved in the Society's Repository.*

SIR,

IN the year 1786, my deceased father did himself the honour of laying before the Society of Arts, &c. his remarks on the improvement of this place; and in a second letter, in 1796, he wrote some further observations; since which time, the plantations, as well as the place in general, have made great progress in beauty and improvement,

ment, which induces me to trouble you with a few ideas, that I flatter myself will be of importance to the country at large, as well as of private benefit to persons in possession of woods, which you will oblige me by laying before the Society.

As the trees have now advanced, as I have before observed, to a considerable size, we have been busy for some years in weeding them out to a timber distance; in doing which, lately, and whilst taking off the bark of some larch trees that were wanted for building purposes, our agent observed the nails of his fingers to be stained, which induced him to think, that the bark of this tree might be useful in tanning leather, a thought that struck the active mind of my father many years ago, when he was desirous of trying its virtues in this necessary and useful business, but was prevailed upon to give up the project, on being told, that a tree containing turpentine would not answer the purpose, his advisers thinking the larch was a species of the fir tribe, instead of the cedar. In consequence of this renovated idea, I was determined to have the most impartial trial made of the bark of the oak, and that of the larch, and in order to shew the latter no favour, I procured some of the best oak bark in the country, such as can rarely be purchased, and took that of the larch from a small young tree. I next purchased two calf skins, of the same value, weight, and quality, and put as much of the fine oak bark to one skin, as was applied of the larch bark to the other, both remaining in the pits the same time. During the operation, as we repeatedly weighed a certain measure of larch liquor against the oak, the latter always required an additional quantity to make the scales equal, which accounts for the skin tanned

by

by larch being above one pound and a quarter heavier than the other, which it was when dried and ready for the currier, the increase being gradually perceptible during the whole business. Which of the two skins proved the best, I leave to the Society to determine, but I flatter myself that, exclusive of the additional weight of that produced from larch, the colour of it is preferable for gloves, saddles, boots, &c.

As I am proceeding with some other experiments, one of them will, I hope, prove which of the two infusions that the skins were tanned in, will afford the greatest weight of leather, in order to produce a fair test of the intrinsic value of both trees, when applied to tanning; the result of which I shall do myself the honour of laying before the Society at a future period.

It must be observed, that the bark of oak and birch, (the two kinds used to any extent), can only be taken off the trees for a very few weeks; whereas larch bark may be collected at any period during three parts of the year; and, I believe, with almost as good effect even in winter; and as the bark is stript off this tree with very little trouble, the expense of doing it is much less than the oak. It is unnecessary for me to inform the Society, that as oak is daily decreasing in this country, so as to require a great annual importation, the larch trees (which I believe there is little doubt of being the cedar of Lebanon) is in a fair way to be as celebrated hereafter, as it was in former times.

In my professional exertions of laying out grounds, and planting by contract, I am constantly regretting the mischief done to woods, by the want of thinning them, which some of my employers tell me they neglect doing, from

from the difficulty of finding sale for the weedings, which the probable source of consumption for the larch bark, will, I hope, entirely do away, and that this valuable species of tree, by being left at proper distances, will arrive at such perfection, as to be fit for most purposes, if not all, that oak is applied to, viz. in ship-building, &c.

It is my intention (if my professional pursuits will admit) to publish a small treatise on the Management of Woods, in general, collected from the practice of my late worthy father and myself, that I hope will be found useful.

I have sent, from Durham, by the mail coach, directed to you, in a paper parcel, the two skins, with specimens of the oak and larch barks, used in the process of tanning them; and also the Currier's letter who dressed the skins, which, however, he does not think is to be laid before you.

I am, Sir,

Your most obedient

Humble Servant,

THOMAS WHITE.

Woodlands, August 13th, 1811.

To C. Taylor, M.D. Sec.

Certificates.

SIR,

I am convinced that the trial of the larch bark will bear the most minute inspection, and will answer all the purposes as a substitute for oak bark. The process of curing

curing is in general ten or twelve days, and these specimens were done in twenty-four hours.

I am,
Your's respectfully,

THOMAS GRAHAM,
Currier.

Hexham, August 6th, 1811.

TO MR. WHITE.

THE Honourable Sir JAMES STEUART, of Courtness, called at the Society's House to give testimony in favour of Mr. White's method of using larch bark, for tanning; he had sent one ton of the bark to Mr. Halden, tanner, at Hamilton, whose report is much in its favour, the operation being performed in less time than when done with oak bark, and better in colour, quality and weight.

SIR,

I AM sorry that I have not been able to send before, two pieces of leather, of a strong quality, tanned with larch bark, and which, though perfectly useful for most purposes, would have continued to great advantage some time longer in the tan-pit for making soles of shoes.

With the specimens, I send a pair of gloves, and a remnant of leather, converted into shoes, both tanned with larch bark, by a person at Hexham, who told me that glovers would use nothing else, could they get a sufficient supply.

In addition to the equality that larch bark is upon with oak, in regard to its tanning as great weight of leather of every description, it has the advantage of being *quicker* in its operation, and from its light colour, of being *preferable*,

ferable, as mentioned before, for gloves, book-binding, &c.

It must be observed, that nothing has been introduced into the tan-pit to make leather firmer but bark.

I am, Sir,

Your most obedient Servant,

THOMAS WHITE.

Woodlands, 26th June, 1812.

To C. Taylor, M. D. Sec.

P. S. The leather has not been five months in the tan-pit.

SIR,

I am really ashamed to give you any unnecessary trouble, I therefore request that you will excuse this letter.

Since I did myself the honour of sending to you, on the 26th ult. a parcel of leather, by the Charlotte coach, I am informed, that during my absence from home, and after you had done me the favour to request a specimen of strong leather, my tanner, to expedite the work, had applied occasionally warm water, in cold weather, which may have made the leather less firm than it would otherwise have been; the time that it was in the tan-pit, also, did not exceed four months. If you, therefore, think the leather is not sufficient to pass judgment upon, I will, when my strong hides are ready, send you a specimen of much superior quality. Mr. Curwen has just written to me for some leather, to whom I mentioned the disadvantage it laboured under.

After sending you the two first skins, I put a number of others, of equal weight and quality, into each of the two tan-pits, to try which bark would prove superior in

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the end, and found, on taking out the leather, on the same day, from each pit, although both were equally well tanned, that the larch liquid was the strongest, but did not, as in the first instance, produce much more weight of leather than the oak.

I am, Sir,

Your much obliged humble servant,

THOMAS WHITE.

Woodlands, Durham, July 10th, 1812.

P. S. In your last letter, you request to know the comparative expense betwixt larch and oak barks, in a given number of hides.

I have not yet sold my bark from the larch tree, therefore it is not in my power to answer this question; but as it tans faster, and will probably be at a less price, it certainly will be found an excellent substitute for oak.

SIR,

As I leave home to-morrow, for Scotland, I do myself the honour of writing to inform you, that in a few days will be forwarded another piece of strong leather, such as I use for soles of shoes.

A tanner in this country has produced some very firm leather, with larch bark, by making it undergo the additional process usual for that purpose; but my skins acquire the solidity they possess by the strength of the bark alone.

The longer I try the larch, the better I am pleased with it: and I am certain, that when used in an extensive way, by people that have proper tan-pits, &c. it will increase in reputation very much, and be found far more beneficial

ficial than I have been able, in my limited scale, to prove it.

I am, Sir,

With the greatest respect,

Your most obedient humble servant,

THOMAS WHITE.

Woodlands, Sept. 21st, 1812.

To C. Taylor, M.D. Sec.

P. S. The leather is sent off this day for you, in London. Nov. 21st, 1812.

SIR,

I am just favoured with your's, of the 10th inst. and am infinitely obliged by the trouble you have taken about my tanning operations.

I have enclosed a certificate, as strong as I can make it, and shall send Mr. Mackintosh, in the Haymarket, on Tuesday next, a calf-skin, one half tanned with oak, and the other with larch; and a hide the strongest I have at present tanned with larch.

I do not wonder at John Bull's unbelief, but I hope, in a year or two, hundreds will prove my tanner's testimony correct.

With many thanks for your kindness, I have the honour to be,

Sir,

Your much obliged,

and most obedient servant,

THOMAS WHITE.

Woodlands, 16th April, 1813.

To C. Taylor, M. D. Sec.

I, Thomas

I, THOMAS FARBRIDGE, Tanner, of Woodlands, in the county of Durham, do verify, on oath, before one of his Majesty's Justices of the Peace, that on or about the 21st of June, 1811, I put a calf-skin, weighing, when green, 12lbs, into a tan-pit, to which at different times I applied 43¼lbs. of larch bark; and on the said 21st of June, I put another green calf-skin, of the weight of 12lbs. also, into another pit, and in the same manner applied, at different times, 42lbs. of oak bark, and on one and the same day drew both these skins, when tanned, which, when dried, produced as follows: viz. The larch skin 6¼lbs., and the oak 5½lbs., both skins undergoing exactly the same process, and the former having neither oak bark, nor any other substance of tanning quality put into the tan-pit, but larch bark. And although the larch liquor had 1¼lbs. more bark than the other, it was infinitely stronger; for after the two skins were tanned, I put three sheep skins into each of the pits, and although I drew the three from the larch liquor about twenty-one days before those put into the oak bark, they were in a better state; and, at the end of this second tanning, the larch liquor was the strongest, as I have ever found it to be after every experiment where the weight of leather was equal.

I moreover declare, that the skin which is on the point of going to London, the one half marked oak, and the other larch, was tanned, after being equally divided, one with 43lbs. of larch bark, and the other with an equal weight of oak bark, being put into the tan-pits on the same day, about the 21st of May last, and drawn together about a month ago; and that nothing of a tanning quality was put into the larch-pit, but larch bark alone, and the

process exactly the same in regard to each half, as in the first experiment.

I moreover declare, that the specimen of hide leather sent to London in November last, as well as the hide now to be sent, although tanned in a pit with a number of others, underwent exactly the same process, without any bark or mixture but pure larch bark, and although no comparison was made betwixt it and oak, I am certain it would have required as much bark of the latter to have produced leather of equal good quality and weight.

THOMAS FARBRIDGE.

Durham, April 17th, 1813.

Sworn before me, at the place and date above written,

EDWARD DAVISON,
One of His Majesty's Justices of the Peace for the said County.

I, THOMAS WHITE, of Woodlands, in the county of Durham, do verify, on oath, that to the best of my knowledge, what Thomas Farbridge attests is true; and as I have often, daily, and sometimes several times a day, inspected the tanning process, it was almost impossible that any deception could be practised without my discovering it.

THOMAS WHITE.

Durham, April 17th, 1813.

The said Thomas White sworn to the above statement before me,

EDWARD DAVISON.

MR.

*** MR. WHITE, during the above correspondence with the Society, having informed the Secretary, that his deceased father had been favoured with Nine Gold and Two Silver Medals from them, for planting the trees he is now converting to so valuable a purpose; the Society thought it would render an essential service to the public, to trace the progress of the trees, from the time of their being planted, to that of the application of their bark for tanning; and therefore directed the Secretary to make the necessary inquiries, for that purpose, from Mr. White; in answer to which the following communication was received.

SIR,

Woodlands, Sept. 10th, 1813.

I AM favoured with your's, containing a number of queries, which you request me to answer, by giving an account of the formation and progress of my plantations, at this place; an undertaking I shall enter into with very great pleasure, and be equally glad if the humble production of my pen meets with the approbation of the Society, and is found useful to the public; but I must observe, that, after the correct description given by my late father, in two letters addressed to them, one dated January 31, 1786, which is inserted in their 5th volume; and the other August 30, 1796, it will not be in my power to make a statement of his proceedings without being liable to repetition.

In answer to the first part of your inquiry, I must observe, that the trees, for which he was honoured from the Society with nine Gold and two Silver Medals, were

not planted by themselves, but intermixed, which mode was adopted from an idea, that as different species seek their nourishment at various depths and levels, a greater number could be raised on any given surface of ground, and at the same time afford much more beauty to the eye; which, in my professional employment of laying out grounds, is a principal study. But although these trees have been scattered over the face of the plantations, the better half being composed of resinous kinds, such as larches and firs, this peculiar attention was paid to them, viz. that where the ground promised to suit any particular hard wood tribe, it was consequently planted in greater numbers; but, first from the tyranny of the Scotch firs, and latterly that of the larches, many, where the ground was less favourable for them, have been overpowered, which it was almost impossible to prevent, from the great number planted upon an acre, some at two feet, and others at three; whereas now we find 4½ feet asunder quite near enough.

Notwithstanding the reasons given for planting promiscuously, it is certainly right to consider, in a great measure, what trees are most suitable for sale in the country, as well as the quality of the ground; should the latter not be proper for oaks, which are doubly valuable, in every situation, in most of which, however rich the surface may be, or sheltered by nature, it is necessary to plant larches and firs for nurses, as deciduous trees grow much faster when protected by the foliage of these hardy foresters, which can afterwards be partly or wholly cut away, as may be found most conducive to the interest of the proprietor.

The surface soil, which you enquire about, is in some parts

parts of a sharp sandy nature, and in others rather channelly to the depth of four or five inches, the top inclining to a blacker mould, and the under stratum composed of a grit-stone rock.

Other places are nearly of the same description, only of better quality, and some parts in the low grounds are furnished with a tolerable depth of earth, which the progress of the trees easily points out; for, on the bare and worst ground, nothing but larches, firs, and birches thrive, and consequently not only these do better on land of the same description, but also here and there others; whereas, on the last-mentioned soil, oaks, elms, ashes, beeches, &c. have shewn an inclination to grow as luxuriantly as the resinous sorts, and which are protected with the greatest care, and even the larches cut down to make way for them, but as the Scotch firs are almost exterminated, the larches are certainly the prevailing trees in my plantations.

In answer to your question, when the planting operations began here, I think it was about the year 1776, which were completed in a very few years afterwards.

The holes were made with a hollow spade, invented, with many other tools, by my late father, which are thus much sooner done than by the common method, and the trees planted shallow in the ground, deep planting being the bane of great numbers.

Particular attention was also paid to their roots, which if fibrous and vigorous, the fine appearance of the tops were of little consequence, and therefore the heights of the trees were chosen to suit the exposure, as well as quality of the soil. But notwithstanding the length of time that planting has been practised, scarcely one person in ten, in my humble opinion, puts in trees small enough, being

anxious to gratify the eye with a sight of the tops, without considering, that perhaps, if of the hard wood species, they will make little or no progress till cut down, and allowed to spring up again.

So very different were those planted here, that a party of neighbouring people, after visiting the place, and riding through the plantations, began to enquire where they were, never supposing that the little pigmies under their horses' feet were trees, and would raise towering heads to the height they have already attained.

As this plan succeeded so well on my estate at Woodlands, it has been strongly recommended by us to those employers who only took our advice in the decoration of their grounds, but planted for themselves; and in all our planting contracts, the whole of which amount nearly to 5,000 acres, we never deviated from the mode above alluded to, and the rules which I shall mention in some other parts of this letter.

Many reasons are given for planting trees large out of a nursery, but I scarcely ever saw a spot that I thought was not better adapted to a tree of ten, twelve, or eighteen inches high, than above those sizes; there are, however, situations, such as old woods, and very sheltered places, where oaks and some other trees may be used, 3, 4, or even 5 feet high, but such ought to be removed in a nursery two or three times, to create roots equal to the length of lever above, prior to being planted in the places alluded to.

As in exposed situations particularly, the deciduous kinds of forest trees will not get up without the aid of nurses, such as larches and firs; these should be planted smaller than the objects they are to protect, particularly Scotch firs, not only to enable them to bear the winds

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that may annoy them in the infant years, but also on account of their roots not being so well furnished with fibres. The ages of the Scotch firs, therefore, should be only one year transplanted, viz. three years old, larches and spruce firs, three and four years; and the hard wood kinds, three, four, and five years old, just to suit the situations which they are to be removed to, and the progress they have made in the nursery, always keeping in mind, that the smaller the trees, the sooner they will get footing in the ground and shoot up.

In land of a poor quality, such as mine, the kinds of trees, proper to be first planted, may be as follows, viz. larches one fourth, Scotch firs the same, and the rest of the ground filled up with birches, alders, oaks, ashes, and elms, in such proportions as the ground may direct, by being of a moist or dry quality, &c.

I must now beg leave to mention, that a practice prevails very much in good soils, of cutting the grass in plantations, either for some needy cottagers cow, or, from an idea of its hurting the trees, which method, I always oppose with all my might, being fully of opinion, that trees, in an infant state, receive great benefit from the shelter, and that infinitely more are destroyed by the hook, than by the weight of grass lying upon them, which will in general only injure a few larches and firs, where it is coarse, and the land wet, for want of draining.

In answer to that part of your letter, relative to the propriety of cultivating ground, before planting, by trenching, digging, or ploughing, I must say, that it certainly has a good effect to follow some of those schemes, on clayey bottoms, or in such ground as inclines thereto; and, it is a farther advantage, to keep it pretty clear after being planted, by introducing amongst the trees a crop of

potatoes, and hoeing it for two years after; but all this latter treatment is supposed to be in the most ornamental parts of pleasure grounds, and probably on land of no very great extent. But with respect to such a subject as mine, I am pretty certain, so much expense in digging or ploughing may be saved, and the trees thrive equally well, as I see no progress that they have made where the ground was ploughed, more than in that which was planted in its natural state amongst the wild native heath; and although several acres were trenched, I think the principal advantage which the trees have gained, is in part owing to the superior goodness and depth of soil, where such trenching has taken place, and from being made sheltered. But notwithstanding what I have advanced, I have seen, particularly in the north of Scotland, very bad land that would receive infinite benefit if it was ploughed or trenched so deep as to perforate a close stratum of hard substance, so retentive as to hold water like a dish, and which if not broken, will never permit the roots of the trees to descend below it; consequently, for want of this precaution and necessary expenses, they are frequently blown down long before they arrive at maturity. In general, this obdurate substance is within reach of the plough, but sometimes deeper, and runs through very large tracts of country, like any mineral substance.

I have before mentioned, that all the trees were planted here in holes made with a hollow spade, but larches and firs are often put in, by other persons, by making two slits with the common spade, so as to form two sides of a square, and after lifting up the sod, which of course is fast on the other two sides, treading it down upon the plant; this is much sooner done than by digging holes, and in very light and sandy soils, where it is an advantage

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to disturb the surface as little as possible, this method does very well.

I am happy to have it in my power to answer your letter relative to the value of the wood when cut down, by stating, that last year I took an under-rated average of the growing timber, which made each acre to contain 480 trees, and each tree one cubit foot and three quarters of wood, the value of which at the low price of two shillings per foot, would amount to £84 sterling an acre, exclusive of the bark, which at the present price of eleven guineas per ton, is equal to a third part of the timber, supposing the trees were all larches:—In this estimation some of them did not contain above one foot, whilst others measured eight, ten and twelve feet, and which are growing upon land that only cost one and two guineas an acre, and in order to find out pretty correctly the progress that larch trees make, which we formerly thought would double their size every eight years, I selected six which were from fifty to sixty feet high, and measured the contents by the circles each year's growth produces, and the following was the result.

At ten years old, every tree was supposed to consist of one part; at thirteen years and a half the average area of each section was twice as much; at eighteen years four times as much; at twenty-five years and one quarter, eight times as much; and at thirty years old, when they were cut down, twelve times as much, as at ten years old, which therefore doubled their growth every six years, and six other trees I took an account of at Lindertis, in the county of Angus, (whilst employed there a year ago in my profession of laying-out grounds) and which grew upon much better soil than mine, measured as follows, (viz.), from ten to thirteen years and one quarter, they were twice the size; at eighteen

eighteen years and three quarters, four times as much; at twenty-five years and three quarters, eight times as much; and at thirty-three years and one quarter, when cut down, they were twelve times as large as at ten years old; so that in twenty-three years and one quarter they doubled themselves three times and one half, (viz) every six years and three quarters. And in order to shew how very correctly this mode of calculation agrees with the measurement of living trees, I have for some years back kept an account of several larches, which I numbered for the purpose, taking the girth at six feet from the ground, seven of which trees in the winter 1809, contained 17ft. 2in. 6 eighths. and, at the end of the two following years, their measurement was 22ft. 11in. 9eighths. since which period they and several others have increased pretty much about the same ratio; but as the said trees are every year adding to their height, the increase is evidently more than what I have stated.—From the best information I can obtain to the enquiry you make about the elevation of Woodlands above the sea, and the distance from it, the former is six hundred feet, and the latter twenty miles.

In regard to the question you ask, about what time these plantations were first thinned? I think it would probably happen ten years after planting, but this business always depends upon the progress of the trees, which in sheltered situations will require the axe sooner; and the true guide to ascertain the number to be taken out each time, is, to free every tree that is to remain from the lashes of its neighbour's tops, weeding out the worst first, and always keeping in mind which trees are to stand ultimately.

In a country where hedge-stakes are wanting, or fuel scarce,

scarce, which this work consists of, the expense will nearly be paid.

The second thinning took place about eight or ten years after, or at eighteen years growth, being as soon as the trees began to touch each other again; which produce was found useful for coal baskets, pit props, and crate-wood, as used in glass-houses, besides being of service for many purposes in the lead-mines, &c. &c. this therefore not only paid the expense, but began to make some return for the original cost of planting the trees, &c. At the end of the next six or eight years, when they began to annoy each other again by their proximity, many were large enough for buildings, in addition to the uses before alluded to; and at the next thinning, which is now going on, I sell them as rails for coal-waggons to run on, for timbering and flooring larger buildings, for fence railing, &c. and the larch, which I am happy to say rises in estimation daily, is not only used by others in the great variety of ways before-mentioned, but by myself for some works in husbandry, where ash was before resorted to, viz, for making the entire bodies of waggons, and even blocks and poles, where the greatest toughness is required to carry heavy burthens.—These waggons possess both lightness and durability, and answer perfectly well. I also find the larch to remain sound in the ground, when the small sized oak which is laid near it, and at the same time, as the bottom rail of a coal-waggon way, is going to decay, which perfections are in wood that will attain much greater strength as the trees increase in size.

This last thinning is supposed to leave the trees at timber distances, viz, 12, 15, and 18 feet asunder, which I think far enough to allow larches to arrive at large dimensions; whose roots, when each tree is allowed sufficient room,

room, will occupy as much extent below ground as the branches do above.

With respect to your observations about pruning, I see it so very often put in practice, upon hundreds of trees that ought to be cut down, and so wretchedly performed where it might be of use, that I am afraid more mischief has been done than good by the application of it, exclusive of the large sums thrown away; which makes me almost regret that so much has been written about it. I will, however, according to your desire, copy a few observations written by my late father, to a friend, a year or two before his death, on this subject, and that of shelter.

Pruning.

"Though much has been said against it, I must observe, that no planted wood can be made clear and brought to perfection without it, as trees properly planted and thinned will, by the room allowed, put out large branches, which, if left on, will in a timber state become great knots, and in the fir tribe in particular will make the timber of little value, and unsuitable for many purposes;—certain it is, that this work is often performed very improperly, so as to prevent the growth of the tree, by divesting it of too many branches, and thus injuring the circulation of the sap, for which purpose the foliage of the tree is by nature intended."

"Others in pruning, leave stumps standing out several inches from the stem, which when cut, die of course, and will remain on the tree till its annual growth laid on in circles, covers the whole; and when the tree arrives at timber, and is sawn up, the dead knots fall out, leaving a hole

hole in each plank, which the workmen call dead knots: the method, therefore, which I should recommend is, to begin to prune some little time prior to each thinning, that the woodman may see more clearly what trees are to be taken down, at which time the branches of the fir kind will be small, and the knots consequently so; and those of the larch may be covered with a sixpence.

"To prevent dead knots, the amputation should be performed close to the stem, which will heal in a very short time.

"The subsequent prunings may keep pace with the thinnings, it being a bad mode to defer that work, till the branches become large, or to do too much at one time; and regard ought always to be paid to leave a handsome top, which should be about two-thirds of the whole height.

"These prunings, as well as the tops of the trees taken down, after they have laid a year or two, upon the land, completely banish the wild native heath, and bring up white clover, and other general grasses, which, added to the annual droppings of the larch, and other trees, have, in the course of twenty or thirty years, a good effect in deepening the soil, and preparing it for vegetation."

Shelter.

"This article I conceive to be of so much importance as not to be omitted, which is as essential to the growth of trees as the soil that produces them; as the greater the mass together, the quicker they will grow, particularly in such situations where nature has not provided shelter; which must appear evident by comparing rows, clumps, and

and small plantations, with extensive woods of the same ages; and as the west wind in all parts of this island is more prevalent than any other, there should be always in that quarter a formidable screen of the hardy resinous trees, such as firs and larches, which should be pruned no higher than the wall or hedge that surrounds them; and the article of thinning should only be so performed on that side as to prevent their growing into poles, which would divest the wood of that shelter you wish to encourage. In short, the western border should be so managed, as to make it subservient to the good of their more protected and prosperous neighbours; indeed, they will, by their slow growth to the west, require less pruning and thinning, for so severe is this wind upon trees, that even upon the eastern shore they lean from the west."

The orchard of eleven acres which you mention in your letter, I am sorry I cannot give so good an account of; for, although the trees were planted facing the south, with large masses of wood all round, as the ground sloped quickly, it was rather too much exposed to the east and west winds, but particularly the latter, which came sweeping up the valley before the forest trees were high enough to protect them; which defect, in addition to the injury some of the fruit-trees received in our absence, from the plough, both on their bark and roots, by careless drivers, induced us to take up the best trees, and plant them, large as they were, on a smaller scale, and on a spot more level and perfectly sheltered, where they are now producing very well. But in this northern climate, where we are very liable to untoward springs, fruit trees are often severely handled by frosts, which come on so very late, as to make the produce very precarious, and to injure very much even the tender leaf of the larch, as well as other

forest

forest trees; it is therefore almost impossible to have an orchard, too much sheltered by lofty hedges, rows of trees, &c. which are the only true ways to avoid disappointment, and chagrin at the yearly loss of your fruit; as an example of the good effects of which, I know a cottager's orchard made out of an old gravel pit, so sheltered by hedges, bushes, and trees, as scarcely ever to fail, notwithstanding the barrenness of the soil.

Our late agent, West, whom you mention, and was a most clever active man, died twenty years ago. However, I flatter myself, that any information he could have given relative to these plantations, I have, from my long residence on the spot, been able to detail pretty correctly.

It is with very great pleasure indeed, that I answer your questions, whether the bark of the larch continues in favour with the tanners? one of whom, a customer of mine, who deals very extensively in the trade, has not, I believe, used much oak-bark this season, and probably will not, should the supply of larch be sufficiently abundant.—He finds such advantage in the beautiful light colour of the leather, as well as in the process being shortened, by the larch tanning quicker than the oak-bark, that I think his neighbours in another year will try to have a greater share in the advantage of using this substitute.

I take every method of trying leather tanned with it, and it has never once induced me to have a worse opinion of it than I at first entertained.

At the time I began tanning with larch bark, I tried Spruce and Scotch fir, Weymouth pine, and some other barks, all which I found would tan in a certain degree, but which were of very little comparative value with the larch; and as I supposed the weakness of the fir tribe in its

its timber, would be rendered still more so by taking off the bark, I have lately had an opportunity of proving it, and see that one year after, if the wood is exposed to the weather, it is perfectly unfit for any purpose but the fire, by shewing evident signs of decay; but, notwithstanding this great defect, as my first experiment in tanning with fir bark was only very limited, I was determined, on being requested by Mr. Stobbort, of Hexham, to try it, to do so on a larger scale against larch bark, which, at first appeared to advance pretty equally, but I now find the leather in the larch-pit perfectly done, and that in the other will require as much more time, besides almost double the quantity of bark. As I mention the tanning quality of fir bark, I must also give a comparative statement of the expense of collecting it. Each Scotch fir affords little more than half the quantity of larch of the same dimensions, and takes nearly double the time in peeling, which brings the expense to be almost fourfold that of the larch; as that is the case, and almost double the quantity of bark is necessary to tan the same weight of leather, it can only be an object to be resorted to on the greatest emergency, when little or nothing else can be got, and where it can be collected from wood that is only wanted for firing, as no prudent person would think of destroying his timber for the scanty supply of bark which a fir will afford.

The eleven guineas per ton, which I received last year for larch bark, I only demand this, in order to encourage the use of it; but its true value many farmers have now the candour to say is little inferior to oak bark.

Before I conclude this subject, I must beg leave to add, that, notwithstanding the great extent of plantations made within fifty years in Great Britain, unless the proprietors of land turn their attention to their increase, by filling

filling with trees, every part not convertible to useful tillage, the produce of bark will never do away the necessity of importation; as it requires such a surface of ground to go over, to meet the yearly consumption, as is almost incredible.

And it is a matter of great regret, that within the period mentioned, numbers of them are going fast to decay, from a want of being thinned soon enough, and in a proper manner; which no planter can now have an excuse for neglecting, when the tanner holds out to him, in almost every town, a sure return for his trouble and expense, in addition to the incalculable advantage of permitting the remaining trees to double themselves in value, every six or eight years, which they can only do by a liberal use of the axe.

I am,

Sir,

Your most obedient, humble Servant,

THOMAS WHITE.

To C. Taylor, M. D. Sec.
Society of Arts, &c.

FIFTEEN GUINEAS *were this Session voted to Mr.* JOHN TILLEY, *of Whitechapel, for an Hydro-pneumatic Blow-Pipe for the Use of Chemists, Enamellers, Assayers, and Glass-Blowers. The following Communication was received from him, an explanatory Engraving is annexed, and the Machine is preserved in the Society's Repository.*

SIR,

BEING a travelling fancy glass-blower, I work with a Machine which I have contrived for my own use, and which I have been advised, by a great number of respectable gentlemen, to lay before the Society of Arts, &c. The invention consists of a tin-box, with a partition in it reaching from the top at one end to within an inch of the bottom. The vessel is air-tight at this end, It is three parts filled with water. By means of a tube reaching within half an inch of the bottom, I blow into the water at the air tight end; the air rises in bubbles through the water to the top, and forces the water under the partition into the other compartment. The weight of the water acts upon the air which had been blown in, and forces it through a blow-pipe directed to the lamp, and keeps up a continued blast till the air is exhausted. More air may be blown in from time to time, so as to keep the blast regular and continual. It is thus I execute my fancy glass-blowing. The whole apparatus, including lamp and case, weighs only three pounds and a half.

I believe I am the first glass-blower who ever worked with such a Machine.

If

Mr. T. Whitford's mechanical substitute for Leeches.

Fig. 1.

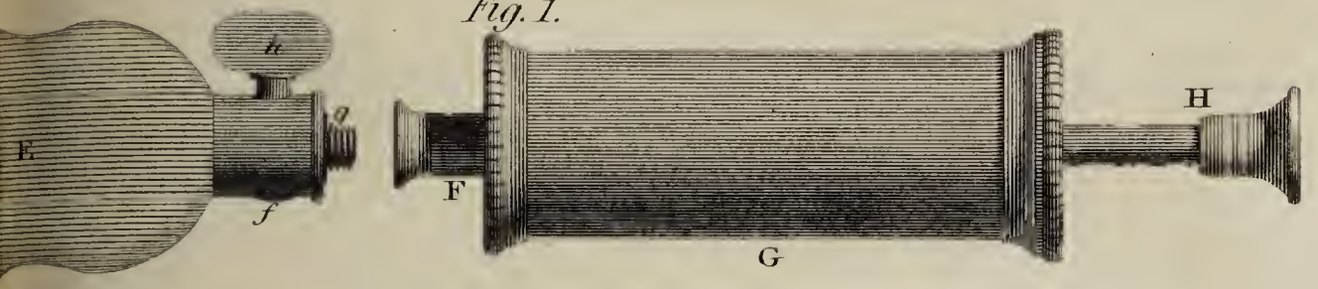


Fig. 2.

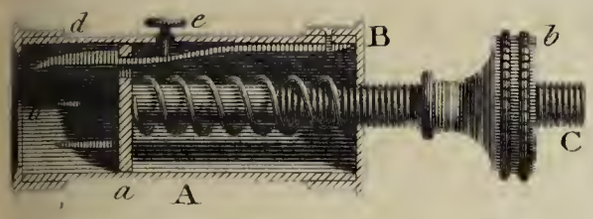
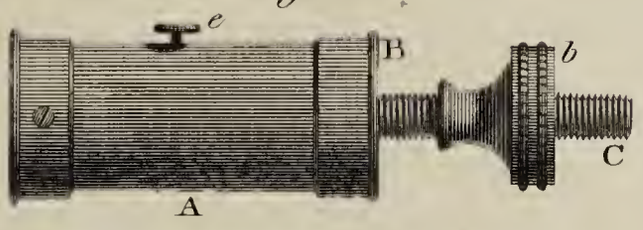


Fig. 3.



Mr. John Tilley's Hydro Pneumatic Blow-pipe.

Fig. 6.

Fig. 8.

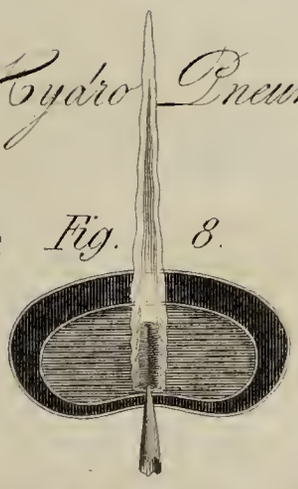


Fig. 4.

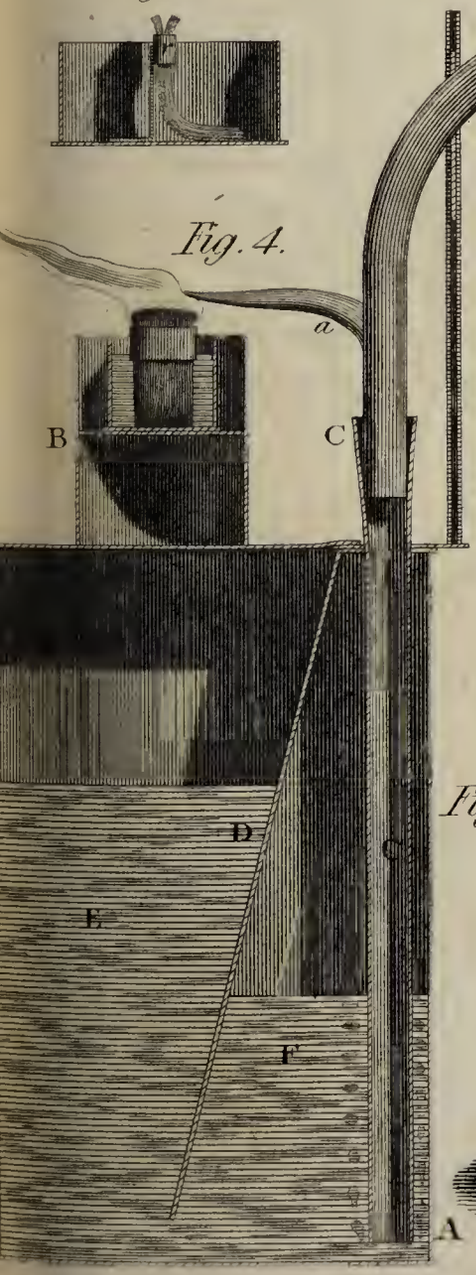


Fig. 7.

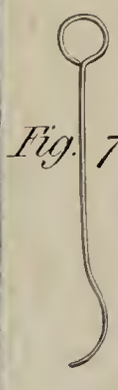
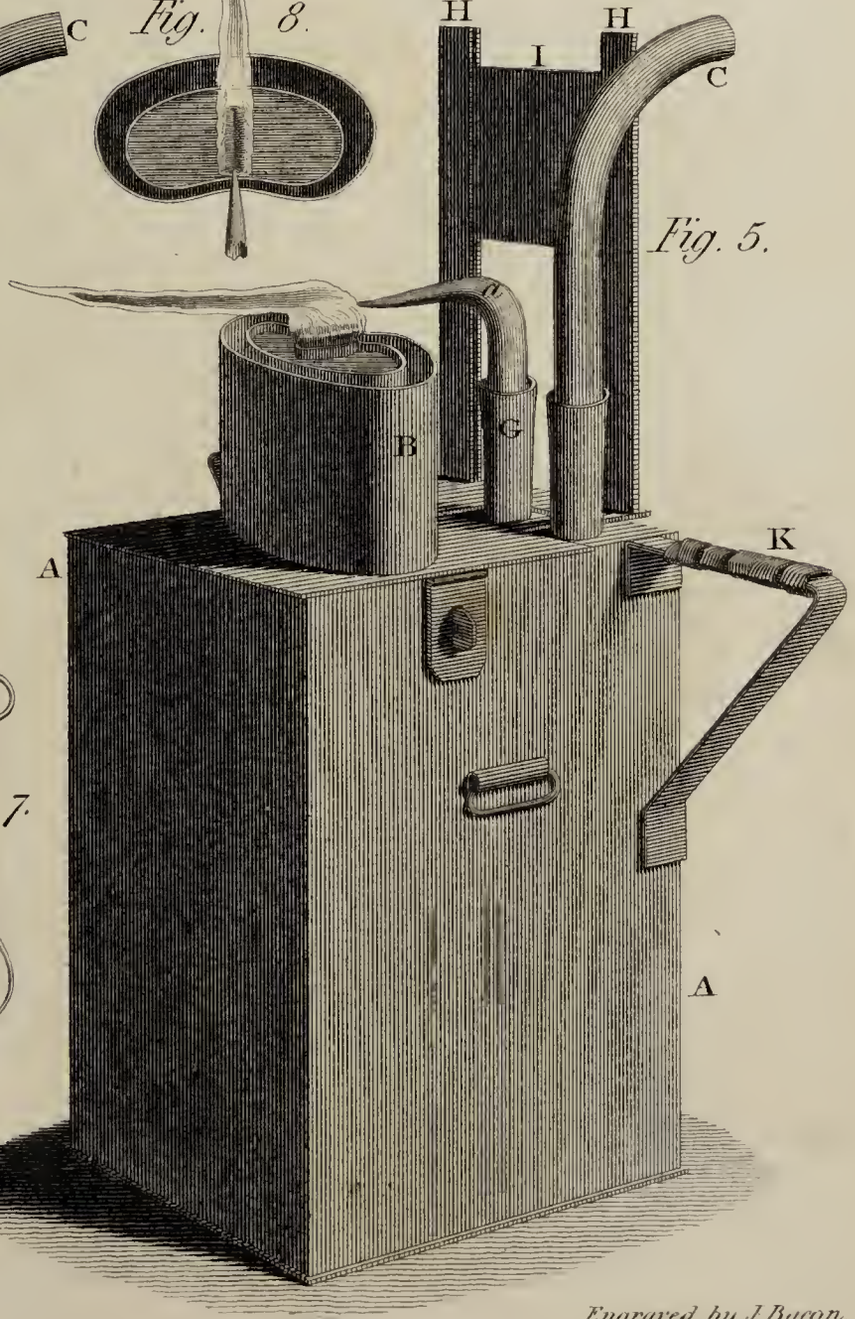


Fig. 5.



by J. Farey.

Engraved by J. Bacon.
27 Fetter Lane.

If the Society should think me deserving of any reward, it will be very thankfully received by,

Your obedient humble Servant,

JOHN TILLEY.

Direct for me at Mr. Thomas Yandall's, bookseller, Old Street Road, near Shoreditch Church.

The apparatus is applicable to the business of enamellers, jewellers, chemists, and many other arts, and can be furnished complete for £2 12 6, made of tinned copper.

March 27, 1812.

To C. Taylor, M. D. Sec.

Reference to the Engraving of Mr. Tilley's Hydro-pneumatic Blow Pipe.—Plate 3. Fig. 4, 5, 6, 7, 8.

The utility of the blow-pipe, in the arts, to raise a great heat in a small object, from the flame of a lamp, is too well known to require pointing out. The assay of minerals, the arts of enamelling, jewellery, soldering metal works, but above all, the blowing of small articles in glass, are purposes to which it is better adapted than almost any other mode of applying heat. The usual manner of producing a stream of air for blowing glass, is by means of a small pair of double-acting bellows, fixed beneath a table, and worked by the operator's foot; a pipe proceeds from these bellows to the top of the table, and terminates in a small jet, before which a lamp is placed, and the flame blown by the current of air upon the object to be heated. The defects of the bellows are, that the stream of air is not perfectly regular, which causes a wavering of the flame, so that it does not fall steadily upon the object which is to be heated. Mr. Tilley's blow-pipe corrects these defects, by using the pressure of a column of water to regulate the

stream of air, and the supply is furnished from the mouth of the operator, by blowing through a tube, fig. 4, C, at a section of this instrument, and fig. 5 shews a perspective view of it in action. A A, is a vessel of tinned iron, or copper, about 17 inches high, 5 wide, and 9 broad; the lid of which opens and shuts on hinges, and supports the lamp B, which burns tallow instead of oil. C is the blowing-pipe, by which the air is thrown into the vessel; this, as shewn in the section fig. 4, has an inclined partition D, which divides it into two chambers, E and F; but as the partition does not reach to the bottom of the vessel, the two compartments communicate with each other underneath it: that marked F, is closed at the top so as to be air-tight; but the other is only covered by the lid of the vessel, and may therefore be considered as being open to the outward air. The pipe C, fig. 4, is soldered air-tight, where it passes through the top of the chamber, and descends very near to the bottom of the vessel, deeper than the partition D does, so that its mouth is always immersed beneath the water. The metallic part of the blow-pipe G, which conveys the blast of air to the flame of the lamp, is likewise soldered into the top of the chamber F, it holds a bent glass tube, *a*, which terminates in a very small and delicate jet, and is fitted air-tight into the tin or copper tube G. Now, by blowing into the tube C, the air is forced out at the bottom of it, and rises in bubbles through the water into the upper part of the chamber F; this displaces a corresponding quantity of water, which passes under the partition D, into the other chamber E, elevating the surface of the column of water, and depressing the other, as shewn in the figure; the water endeavouring to return to its original level, causes a constant compressure of the air, and forces it through the jet *a* into the flame

of

of the lamp. By this means, it is not necessary to blow constantly with the mouth; for, though the air is forced into the receiver at intervals, yet the pressure of the water will expel it in a constant stream, and the operator will not be fatigued by the motion of the foot, necessary in working bellows, nor need even to keep his mouth at the pipe constantly, but merely to blow from time to time, as he finds the stream of air to decrease in its power.

The metal socket which connects the glass tube or blow-pipe *a* with the vessel A, is made conical, and the tube, having a piece of paper first wrapped round it, is bound round with cotton-wick yarn in a conical form, so as to fit the socket tight, and yet permit the tube to be moved in any required direction, to cause the air to act properly upon the flame; and the curved metal tube C is also fixed into the upper part of the tube C in the same manner. H H are the two sides of a tin frame, which is fixed in front of the vessel, and has grooves withinside of them to receive a tin plate I, which forms a screen, and can be adjusted in height so as to keep the light of the lamp from the operator's eyes, though he can see the work over the top of it: this screen is held fast by its foot being placed between the lid of the vessel and the top of the close chamber F. K is one of two handles, which support the operator's arms whilst holding a glass tube or other matter in the flame, and there is another like it at the opposite side of the vessel: these handles are also wrapped round with woollen list or leather, so as to form cushions; and the vessel is steadily fixed upon a chair, bench, &c. by means of a leather strap buckled to the loops on each side of it, and passing under the chair, &c.

The lamp is made of tin, is of an elliptical, or rather of a bean or kidney shape, one side being carved inwards;

across the centre of it stands a metal wick-holder, having a loop on one side of it, and which is soldered to its bottom, (see *r*, fig. 6.) Through this loop the wick of cotton is drawn, and being opened both ways, as shewn in that figure, and still plainer in fig. 8, forms a passage in its middle, through which the current of air from the jet *a* passes, as in figs. 4 and 8, and carries the long pointed flame upon the object to be heated. The lamp, figs. 6 and 8, is filled with tallow, which, melting by the heat, becomes fluid, and burns as well as oil, but with a less offensive smell, and when cold, being solid, is more conveniently carried than oil. This lamp is placed within another vessel marked B, figs. 4, 5, and 8, which supports it at a proper height, leaving a spacebetween them all round, to receive any tallow which may run over the edge of the interior vessel or lamp.

In using this blow-pipe, the following observations being attended to, will greatly increase its effect. The long flat cotton wick of the lamp will be found to act better than the usual round cotton wick ; but in either case, the flame which it raises will be considerable. The end of the glass pipe *a* must be just entered into the flame, and the current of air will throw out a cone of flame from the opposite side. If it is well managed, this cone will be distinct and well defined, and extend to a considerable length. Care must be taken, that the stream of air does not strike against any part of the wick, as it would then be disturbed, and the cone split into several parts. (A wire bent at its end, as shewn at fig. 7, is very convenient to smooth the passage through the wick :) the jet of air must be delivered somewhat above the wick; and as, unless the flame was considerable, there would not be sufficient for the stream of air to act upon, for this reason the wick is opened,

opened, as shewn in fig. 6, that it may expose the largest surface, and produce the greatest flame; the stream of air from the pipe should be directed through the channel or opening between the wick, so as to produce a cone the most perfect and brilliant. On examining this cone of flame, it appears to be formed of two different colours, the part nearest to the lamp being of a yellowish white, and that beyond of blue or purple colour.

The subject which is to be heated, is held in the flame at the termination of the yellowish-white flame, where it receives the greatest heat, and is not discolored by the soot which accompanies the white flame.

Glass tubes are, when applied to this flame, quickly rendered pliable, and may be bent or drawn out into threads or points, and hermetically sealed; or, by blowing into the other end of the tube, it may be expanded into a small globe, so as to form various small articles at the pleasure of the operator.

In chemistry, mineralogy, and the arts, the blow-pipe is an extremely useful instrument, being capable of throwing such a powerful heat on a small object, as would be difficult to obtain on a larger quantity of the same substance, in the most powerful furnaces: and with this advantage, that the process is always under the inspection of the operator; whereas he can only conjecture what passes in the centre of a furnace.

In using the blow-pipe for experiment, a piece of charcoal is generally used to support the subject, and held in the flame of the lamp; the charcoal should be of a close compact grain, and properly burnt; for, if it is too little carbonised, it will flame like a piece of wood, and obscure the object; and if it is too much burnt, it is so quickly consumed, and burnt to ashes, that the object is in

danger of being lost in it; the charcoal greatly increases the heat, by reverberating the flame, and by heating the object at the opposite side; itself being converted into fuel, and excited by the blast, and thus creates an atmosphere of flame and heated air around it, which prevents the heat being carried off so fast, or the object being so much cooled, as if it should for an instant be moved out of the cone of the flame, from the unsteadiness of the hand, or from accidental currents of air, which would disturb the flame, and cause such a wavering in the point of the cone, as to divert it in some measure from the object. In order to prevent more tallow than is necessary from being consumed, to produce the intended effect, it is convenient to have several lamps with wicks of different thicknesses, viz, one to hold two flat cottons, (such as are used for the Liverpool lamps) of about 1¼ inches broad; another to hold four, and a third to hold six, or as much common wick yarn, as is equal to those wicks in bulk, glass jets should also be provided of different sized apertures, to suit the greater or lesser sized wicks and flames, and deliver streams of air upon them proportionately, and their jets should point upwards in a small degree: hogslard is also equal or perhaps superior to tallow for the lamp.

TEN GUINEAS *were this Session presented to Mr.* CHARLES DRURY, *of Mansfield, Nottinghamshire, for making an useful Paste from Potatoes for Weavers, Bookbinders, Trunkmakers, Upholsterers, &c. The following Communications were received from him.*

SIR,

PERMIT me to lay before the Society of Arts, &c. a substitute for wheat flour paste. I have given it a fair trial for ten months past, in order to convince myself and others of its usefulness. From these experiments, I have no doubt it will prove equal, if not surpass that made from flour, for paper-hangers, stationers, weavers, trunk-makers, callico-printers, &c. and also for labels, cards, and pasteboard, as it may, with ease, be made free from lumps, and does not admit the air to get under the paper as in common paste, or injure the colour. It is free from any offensive smell, and not above one-third of the price of that prepared from flour. The use of potatoe paste will cause a saving of many thousand bags of flour annually, to be applied to the nourishment of mankind.

One peck of potatoes, when prepared, will make upwards of thirty eight pounds of paste, and one acre of land planted with potatoes, would produce more than many acres of wheat. I shall be happy to attend, and give the Committee full explanation upon the subject.

I remain, Sir,
Your most obedient, humble Servant,
CHARLES DRURY.

Mansfield, May 1st, 1812.

To C. TAYLOR, M. D. SEC.

Process for preparing Mr. Drury's Paste from Potatoes.

Take one pound of raw potatoes, well washed from dirt, grate them fine on a common tin grater, without paring them, into two and a half pints of water, then boil the whole mixture immediately, and stir it well during the whole time of boiling, which should be about two minutes, then remove it from the fire, and add to it half an ounce of finely powdered allum, by gradually sprinkling it into the paste, and stirring it with a spoon, till the whole is perfectly incorporated. It will then be fit for use, and forms a beautiful transparent paste.

Letter from SIR JOHN SINCLAIR, *Bart. President of the Board of Agriculture.*

DEAR SIR,

This will be delivered to you by Mr. Charles Drury, whose mode of making Paste seems entitled to the attention of the Society of Arts, &c.

I remain, dear Sir,

Your very obedient Servant,

JOHN SINCLAIR.

27, Old Burlington street,
May 29, 1812.

To C. TAYLOR, M.D. SEC.

Certificates were received from Mr. Richard Free, Trunkmaker, 115, High Holborn ; Mess. J Viney & Co. Trunkmakers, 122, Aldersgate Street ; and Mr. F. Clark, Bookseller, 33, Piccadilly ; all stating Mr Drury's potatoe paste to be equal to that made with flour, and that, after being made ten or twelve days, and exposed to the air, it did not appear to be in the least changed.

*** Mr. Whately's machine, see Plate 1, for reducing potatoes to a pulp, would be found highly advantageous to use where a considerable quantity of potatoe paste is made.

PAPERS

IN

POLITE ARTS.

The GOLD MEDAL *of the Society was this Session voted to Mr.* JOHN FAREY, *Jun. of Upper Crown Street, Westminster, for an Instrument for describing or drawing Ellipses of various Forms and Sizes. The following Communications were received from him; Two explanatory Engravings are annexed; and a complete Instrument is preserved in the Society's Repository.*

SIR,

WITH this you will receive an instrument of my invention, for describing ellipses, which I wish you to submit to the Society of Arts, if you think it an object worthy their attention.

Having constant occasion, in my profession, to delineate circular objects in perspective, I found great difficulty in drawing ellipses with sufficient accuracy and neatness

neatness by hand, and therefore, at different times, tried all the inventions I ever heard of for the purpose, but without finding them at all applicable to the art of drawing wheels, cylinders, and other mechanical objects in perspective; notwithstanding that many would produce a very fair and delicate curve, they were not general in their applications and adjustments.

About three years ago, I invented the instrument now sent you, and have since made constant use of it, in perspective drawing, for which it is perfectly well adapted. I have in that time made about thirty of them for different artists and gentlemen, who have been so much pleased with them, as to determine me to make it public, through the medium of your useful Society, if they esteem it worthy a place in their Transactions.

I shall be happy to give any farther explanation which the Society, or their Committee, may require, and am,

Sir,

Your most obedient Servant,

J. FAREY, Jun.

No. 12, Crown-street, Westminster,
March 2d, 1813.

To C. Taylor, M. D. Sec.

Reference to the Engravings of Mr. Farey's Elliptograph, or instrument for describing Ellipses.—Plate 4, Fig. 1, 2, *and* 3; *and Plate 5, Fig.* 1, 2, *and* 3.

This instrument is completely general in its properties, being capable of describing ellipses of any possible dimensions,

Mr. Farey's Elliptograph, or Instrument for describing Ellipses.

Fig. 3.

Fig. 2.

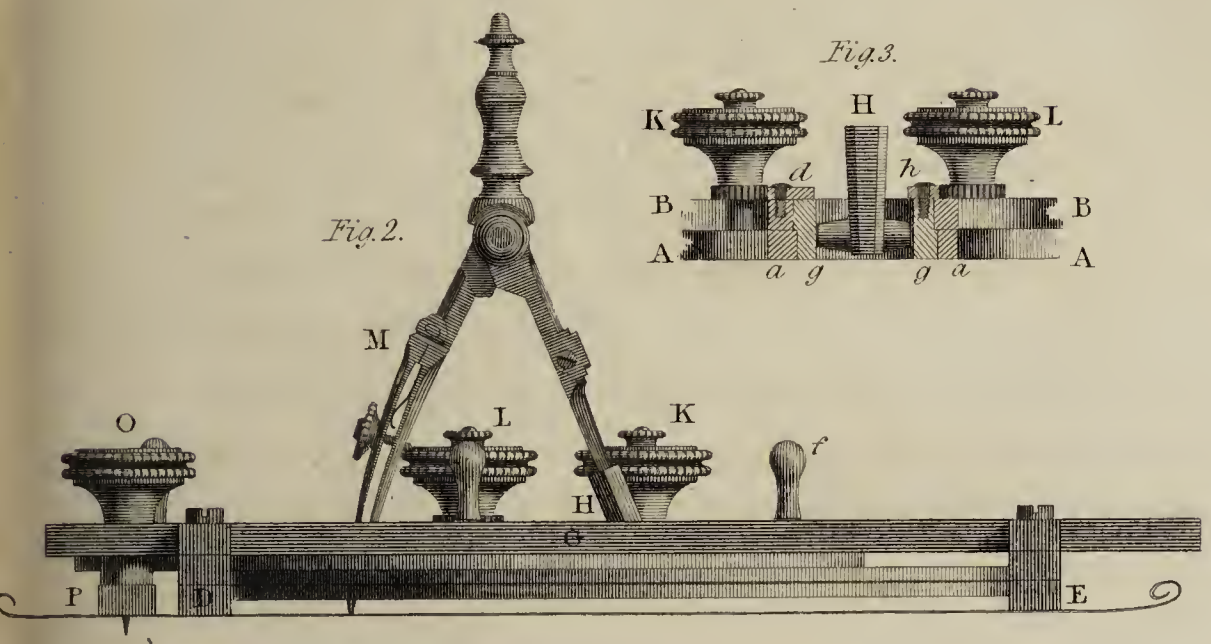
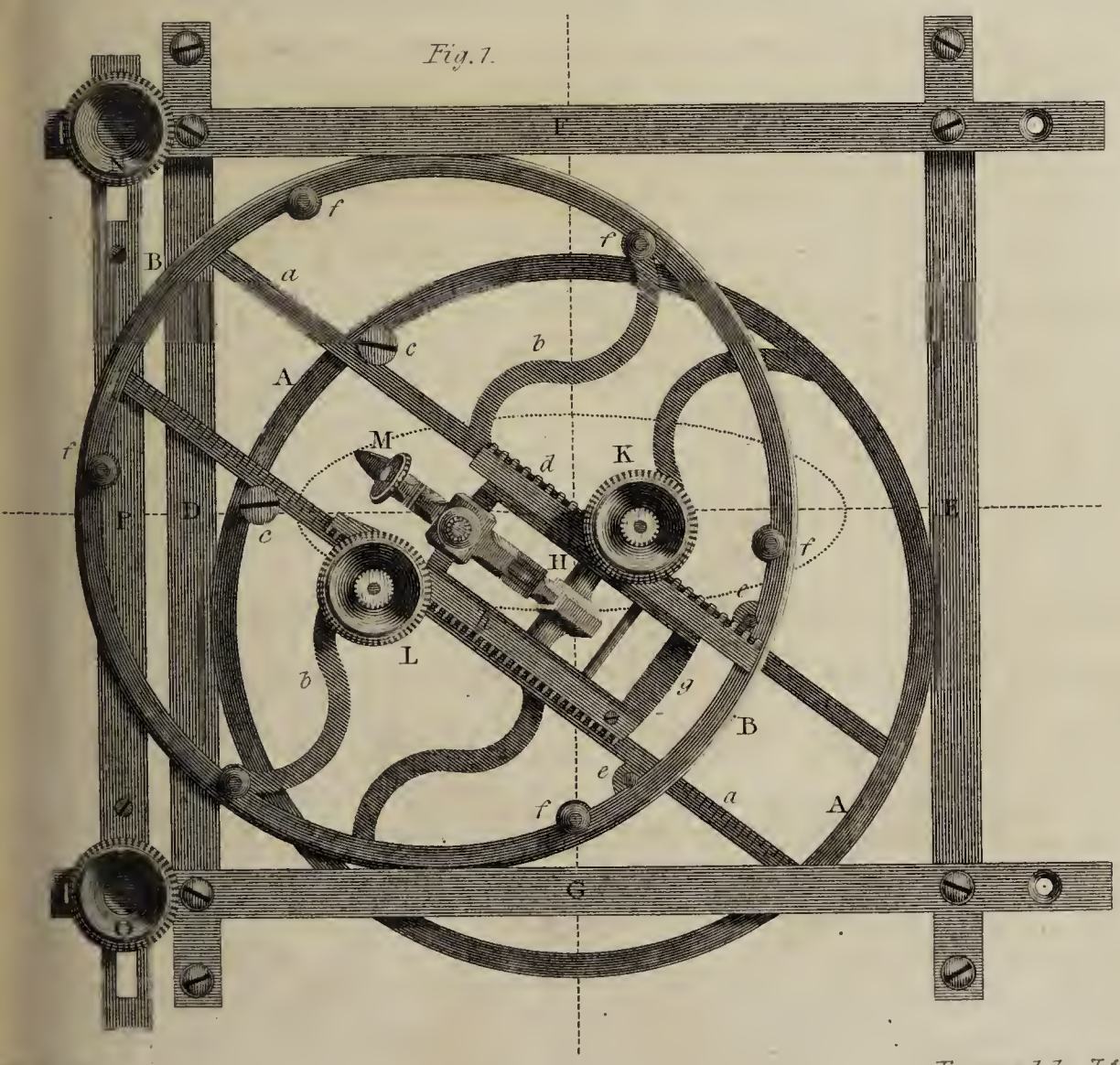


Fig. 1.



Drawn by J. Farey

Engraved by Ja.s Davis

tions or proportions of diameter, within the size of the instrument, as is clearly shewn by the specimens of its performance given in Plate 5; these were drawn upon the copper plate by the instrument itself, which is equally applicable for engraving as for drawing; the general size of the instrument is twice as large as the drawings in Plate 4: when it is used, it is placed upon the paper, or surface where the ellipsis is to be described, and the square frame held fast by one hand, while the moving circles are turned round by the other, to trace the curve by means of a drawing pen, properly situated for that purpose. Fig. 1, of Plate 4, represents the whole instrument, looking down upon it in plans, whilst fig. 2 is an elevation, to shew the thicknes of its several parts; and fig. 3 is a cross section.

The moving parts of the instrument consist of two brass circles (A B) of equal dimensions, so fitted together that they will slide one upon the other, by means of the pinion K, to separate their centres to any required distance within the extent of their radii; the circles have no central bar, but instead thereof have two bars, *a a*, parallel to each other, and at some distance from the centre, leaving an open space between them, in which the drawing pen or tracing point is situated; there are also crooked arms, *b b*, proceeding from the bars *a a* to the circular rim, to give them sufficient strength, and these being all the bars across the circle, leaves them sufficiently open to see the curve as it is traced beneath, by the drawing pen.

The circles are united by screws at *c c*, screwed into the lower circle, and the two bars *a a* of the upper circle are included between them; this keeps the two together, but at the same time admits of sliding them one upon the other in the manner of the figure: At *e e* are two other

screws,

screws tapped into the other circle, and retaining the bars of the lower one in the same manner. The centre pin for the pinion K is fixed on one of the arms of the lower circle, and acts upon a rack *d*, screwed to the upper circle, so that it separates the two when turned round by the finger and thumb, applied to the middle head K, upon it, but the circles are fitted together so tight by the screws, that they will not separate from each other except by the power of the pinion, and may, in the motion of the instrument, be considered as firmly united together, but capable of having any degree of eccentricity given to them by means of the pinion K.

The circles are turned round in their square frames, by means of six small handles, *ffffff* fixed in the run of the upper circle; to any two of these the thumb and finger of the right hand are applied.

The frame or fixed part of the instrument consists of 4 straight rules DE, and FG, the latter are screwed down upon the former, and are therefore in a plane above them, as is shewn by fig 2, plates of brass being interposed between them, at the angles, to separate them to a proper distance.

The lower circle 4, is fitted in between the two lower rulers, D E, and slides freely to the direction of their length, but has no shake sideways; in like manner the upper circle B is included between the edges of the rulers FG, and therefore moves in a right line, in a direction perpendicular to the former; thus the frame forms two grooves at right angles to each other, in which the circles revolve, with an eccentric motion, the upper circle sometimes hanging over the lower rulers, and the lower circle passing under the lower rulers, as is shewn in the figure.

The result of this motion is, that a tracer placed on any

part

part of the circles when they are rendered eccentric, will describe an ellipsis on the surface beneath, but the only tracer which is used for drawing, is situated between the bars *a a*; into this space a small carriage or frame *g* is fitted to slide freely from one end of the opening to the other, by means of a rack *h* screwed on one side of it, with a milled head and a pinion L turning on a center pin fixed into the upper circle B B, the frame has a brass socket, H, moving on a center pin fixed across it, and having a hole in it for the reception of the leg of a pair of common drawing compasses, M, which stand as in fig. 2, when in use, the pen tracing the curve upon the paper; but they admit of being lifted up, on the center pin of the socket H, and then for the convenience of setting the instrument, the circles can be turned about without making any marks.

The transverse section, fig. 3, shews the frame *g g*, and the manner in which it is fitted into the bars *a a* of the circles, also the socket H, moving on its center pin, and the two pair of racks and pinions, K *d*, and L *h*, the former for the purpose of separating the circles, and the latter for moving the frame *g* along between them; the frame *g* is so fitted that it continues at the same point, with respect to the upper circle B, when the center of the two are separated from each other by the motion of the pinion K, and may therefore be considered as immoveable when the lower circle only is moved.

To keep the frame of the instrument stationary upon the paper whilst it is used, two sharp pins are fixed in the ruler P, which penetrate the paper, and make it quite fast, when they are held down by the finger and thumb of the left hand applied upon the heads of the nuts, N O; these are introduced to unite the ruler P with the ends of the

two upper rulers FG, but the screws of these nuts passing through grooves in the ruler P, admit the whole instrument to be moved on the paper a small quantity parallel to itself, in the direction of the ruler P, though the friction of the fitting is such, that it will not move unless some force is applied for that purpose; the same screws, where they pass through the ends of the rulers FG, are also received in grooves, so that by unscrewing the nuts, the whole instrument can be moved sideways, a small quantity nearer or farther from the ruler P, but by screwing these nuts fast, the screws become fixed to FG, though they still admit of moving in the grooves of the ruler P.

The reader will now comprehend the structure of the instrument; the circles are capable of revolving in the frame set with any required degree of eccentricity; and the tracing point or pen can be removed to any required distance from the center of the upper circle B; the compasses M, being opened to the extent of a mark made upon one of the bars of the frame, and then being fixed in the instrument, by pushing them into their socket H, it is ready for use.

In this state, suppose the two circles set by the pinion K exactly concentric with each other, and the pinion L turned till the end of the frame g comes in contact with the rim of the instrument, then the point of the pen M will come exactly in the center of both circles, and the circles being turned round in the frame by their handles, the pen will only mark a small point on the paper, which will be the center of any curve the instrument may be afterwards made to describe.

By turning the pinion L, the point of the pen may be removed to any distance from the center, within the radius of the instrument, and it will, when turned round, describe a circle which may be made of any radius, from

the

the smallest point to the size of the circles; this is the simplest case of the instrument, and may be considered as an ellipse when the difference of its diameter is infinitely small; see X in plate 5 of specimens, fig. 1; when the circles are rendered eccentric it draws an ellipsis, and by turning the pinion L the breadth of the ellipsis will be determined, and by the other (K) the difference between its breadth and length is regulated.

Suppose the pinion K turned to render the circles eccentric without moving the other pinion, the pen therefore remains in the center of the upper circle, in this case the pen will describe a straight line, equal in length to twice the eccentricity of the circles, see Y, fig. 1, plate 5; this is evident, because the circumference of the upper circle BB, moving against the straight edge F and G, its center must describe a line parallel thereto; this case may be considered as an ellipsis without breadth, for if the pen is set the smallest quantity out of the center of the upper circle, it will draw a very narrow ellipsis, and by setting it at different distances from the center, any required proportion of ellipses may be described, as shewn in Plate 5, of specimens.

The conjugate diameter will in all cases be equal to double the distance from the point of the pen to the centre of the upper circle, and the difference of the conjugate and transverse diameters will be always equal to twice the eccentricity of the two circles.

The principle on which this instrument operates, is the same as the trammel, employed by carpenters, and other artificers, for striking ovals, by means of a board with two cross grooves in it, and a beam or radial bar, which has two pins to operate in the grooves, and a third to draw the curve; to prove this, suppose P P, and Q Q, fig. 2,

Plate 5, to be the two diameters of the intended ellipsis, then, if the three points *d*, *e*, and *f*, are marked upon an inflexible bar, and the points *d* and *e* constantly applied to the two diameters, P Q, and a tracing point situated at *f* is carried round by the bar, it will describe an ellipsis R R; this is the principle of the trammel, but its defects, as at present constructed, are well known.

First, it will not draw any ellipsis which is less in either of its dimensions than the size of the board or frame containing the cross grooves, representing the two diameters P P, and Q, Q; nor can it draw much larger, unless the diameters are nearly equal.

Secondly, it is difficult to fix the cross firmly on the paper, or to bring it to the exact point required for the centre of the ellipsis, and, thirdly, when this is done, the most perfect workmanship in the grooves and sliders, can scarce ensure that it shall move freely without shake or improper motions, so as to make an accurate and fair curve.

All these defects are obviated in the present invention, by extending the two points *d* and *e* to become the largest circles, A B, fig 1, plate 4, and then the rulers D E, and F G, represent the sides of the grooves, in which the points move; the point of the pen of the compasses M, now represents the point *f* in all its properties of moving along the bar, to enlarge or diminish the ellipsis, but with the advantage that it can be actually brought to coincide with one of the points *d* or *e*, when of course it will draw a straight line, and if brought to agree with both of them, it will describe only a point; therefore this instrument will describe any possible variety of ellipses within the limits of its radius, either as to size, or proportion of its diameter. An example of which will be seen in Plate 5, fig. 1, containing instances of its powers of drawing a right line, a circle, and various ellipses.

Directions

Directions for using the Instrument.

When any ellipsis of given dimensions is to be drawn, the paper is prepared by drawing the two diameters, about four inches long, upon each of these, set off with the compasses the four points where the intended curve is to intersect the lines. This preparation is not essential, but it assists in setting the instrument in its true place; first, fill the drawing pen of the compasses with Indian ink from a camel-hair pencil, (for common ink soon destroys the steel points of the pen;) then adjust the screw, that the pen will draw a proper line; and fix the compasses into the brass socket H, so that they have no shake or looseness in the fitting; turn the circles about in their frame so that the pen is towards the side marked G; now place the whole instrument in such a position, that the centre of the four rulers coincides with the centre of the intended ellipsis. This may be estimated; or, by previously producing the two diameters, the frame may be set very nearly, taking care to place the upper rulers F G parallel to the greatest diameter. Here fix the instrument, by pressing the two pins or points of the ruler P, into the paper, and hold it fast, by placing the thumb and forefinger of the left hand upon the nuts N O, leaving the other hand at liberty to turn the circles about, by applying the finger and thumb to any opposite two of the small handles g. Now, by turning the pinion L, remove the drawing pen to the extent of the shortest diameter of the ellipsis; then turn the circles one half round by the handles, and examine if the point of the pen comes exactly to the opposite end of the shortest diameter; if it does not, adjust

the error one half, by moving the pen by turning the pinion L; and the other half, by moving the whole frame on the paper. The screws of the nut NO, will admit this motion, being fitted into grooves in the ruler P, (which should not be disturbed,) but the nuts should not be screwed so tight as to prevent the motion; then, by returning the circles back again, its accuracy will be ascertained; for if it meets the former mark, it proves that the circles are in the right centre, and the compasses are set to the proper diameter for the conjugate axis; now turn the pen towards the length of the ellipsis, and without altering the compasses or pinion L, slide the circles one upon the other by the pinion K, till the point of the pen arrives at the mark made for the length of the ellipsis; turn the circles half round to the opposite end, and if they match the mark made there, the adjustment is correct; if not, one half the error must be corrected by moving the circles with their pinion K, and the other by moving the whole frame on the paper. To do this, the nuts N O must be made slack, and then the frame will be at liberty to move, as before described; but the ruler P must never be removed after the first fixing, and the side D of the frame will of course be a greater or less distance from it.

The adjustments being made in this manner, the pen may be suffered to rest upon the paper, and trace round the curve. The precautions of turning the circles to the opposite sides will be unnecessary, except where great accuracy is required. In turning the circles about, a habit will be easily acquired of pressing with equal force on the two opposite sides of the circles, and then they will turn round pleasantly.

It will save much trouble in adjusting the place of the instrument upon the paper, if the compasses before being put

Specimens of Curves
Drawn by
Mr. Farey's Elliptograph.

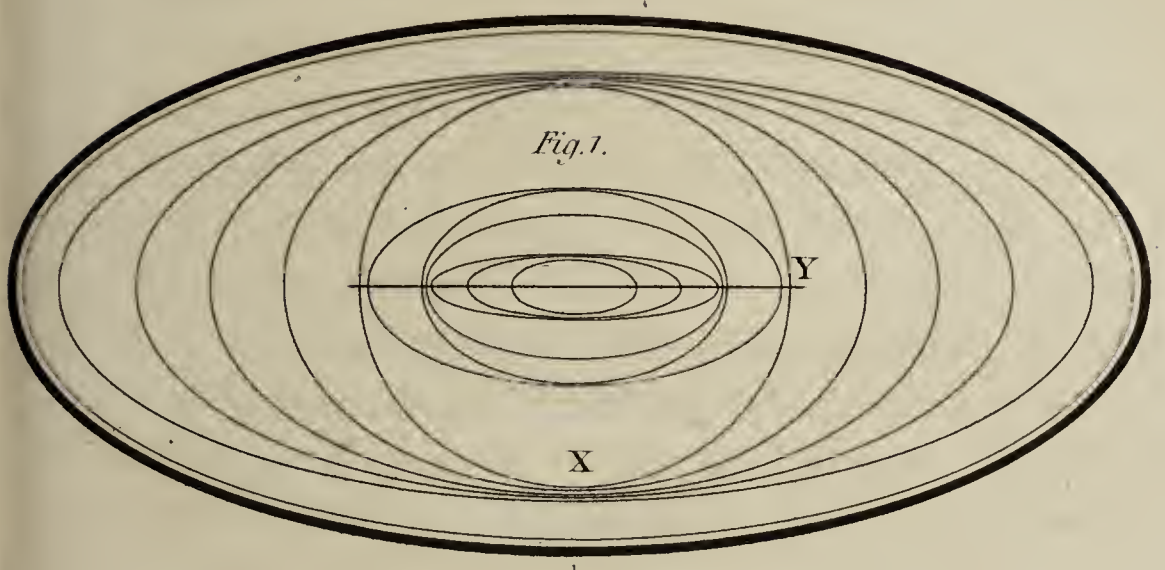


Fig. 1.

Fig. 2.

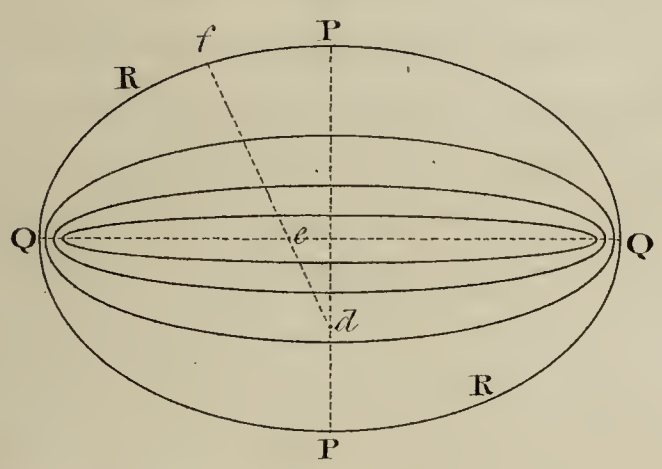
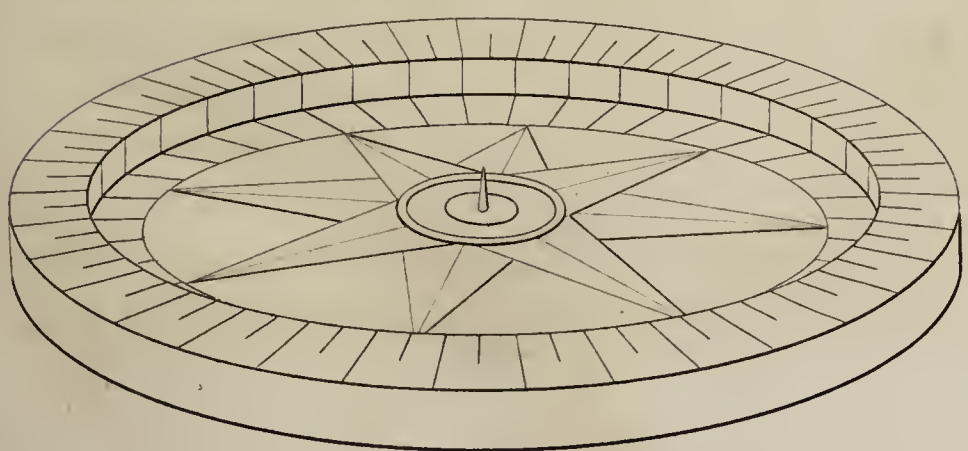


Fig. 3.



put into the socket H, are opened to the extent of the arch struck upon the ruler G; then, when the compasses are put into their socket, and the pinion L turned back as far as it will go, the point of the pen will come exactly into the centre of the ellipsis which it is intended to describe; if, therefore, the centre of the ellipsis is marked upon the paper, and the point of the pen (when opened to the above extent, and the pinion L turned till the end of the frame g touches the rim of the circle,) being brought by moving the whole instrument on the paper, to this mark the instrument is adjusted at once as to its position on the paper, and the other adjustments for the dimensions of the ellipsis required to be drawn, must be made as before directed.

After having drawn an ellipsis, if it is required to draw another parallel to it, to shew the thickness of a circular plate, for instance, as in fig. 3, Plate 5, set the pen opposite G, Plate 4, fig. 1, and by the screws of the nuts N O, as before mentioned, being fitted in grooves, the frame and the circles may be moved with the longer axis parallel to itself, so as to describe another ellipsis parallel to the former.

SIR,

SINCE I had the honour of receiving the Gold Medal, which the Society for the Encouragement of Arts, &c. awarded to me for my invention of the Elliptograph, I have made two instruments on a larger scale, for engraving or etching ellipses on copper-plates, which will enable Engravers to give the same beauty of outline to their work which is attainable by its assistance in drawing. These

instruments do not differ from that which I have described in my former communication to the Society, except in having screw adjustments instead of rack and pinion movements: their dimensions are enlarged, and their workmanship is required to be exceedingly accurate, because the smallest possible motion or shake in any of the fittings would produce evident irregularities in the curve when traced with a delicate point on a copper plate; although the same irregularity on paper would not be visible, but appear as a perfect and fair curve.

I have also made an instrument for my own use, for the purpose of assisting engravers, who engrave from my drawings, by describing their ellipses accurately on the copper plates: the first which have been executed by this, are on those plates of the present volume of the Society's Transactions engraved by Mr. Davis, and one of Mr. Grant Preston's Binnacle, engraved by Mr. Turrel. For the former of these gentlemen I am making a large instrument, which he wished to be on the most perfect plan I could devise. It appeared to be particularly desirable to have the means of dividing the circumference of an ellipsis, into any number of divisions in the true perspective appearance of a divided circle, for representing cog wheels, the ornaments, columns, &c. of circular buildings, arched windows, and other purposes, which constantly occur to artists. In this I have succeeded perfectly, having invented a general method of dividing the circumference of an ellipsis into any required number of divisions which shall be the representation of a divided circle, either in true perspective, which is called by artists the scenographic projection, where the divisions on that side of the ellipsis most distant from the eye will be smaller than those on the front side, which are nearer to the spectator;

this

this is very clearly explained by fig. 3, Plate 5, of specimens of curves drawn by the instrument. The same instrument will divide in the orthographic projection, where the eye being supposed to be at an infinite distance from the object, the rays fall parallel on the picture, and project the divisions on the distant and adjacent sides of the same dimensions, and only give that difference in the several divisions which is produced from each being viewed in a different degree of obliquity by the eye. This method of dividing is founded on a principle, which, to the best of my knowledge, is a new discovery, no general method of dividing an ellipsis having yet appeared. I have made a model, to which the dividing apparatus applies, and acts very completely, as will be evident from an inspection of the divisions of the compass, fig. 3, in the plate of specimens, and also in the teeth of the cog wheel and trundle of the drawing of Mr. Durand's machine for braking hemp and flax, Plate 17, both which are drawn on the copper by this instrument. When the instrument is set to describe a straight line, as explained in the description of it, if the dividing apparatus is applied, it will divide the line into equal divisions proper to represent the edge of a cog wheel, the middle division being of its full dimensions, and proceeding from thence towards either end, they gradually diminish, till at the ends they vanish. When adjusted to describe a circle, it will divide the circumference into any number of equal divisions; or for any ellipsis, it will give either orthographic or scenographic divisions, as before mentioned.

Several improvements in the mechanical construction of the dividing apparatus having suggested themselves since the model was finished, I wish to prove them by practical application to a large sized instrument, before I submit

I submit a full description of it to the Society, and being now much engaged in other matters, I fear this cannot be done in time for an engraving to be made for the present volume; but hope, at some future period, to have the honour of presenting a communication on the subject to the Society.

I am, Sir,

Your most obedient servant,

J. FAREY, JUN.

No. 12, *Crown-street, Westminster,*
Dec. 6th, 1813.

TO C. TAYLOR, M.D. SEC.

The LESSER GOLD MEDAL *of the Society was this Session voted to* PELTRO WILLIAM TOMKINS, *Esq. of New Bond Street, for refining Ox Gall, so as to make it colourless; and for rendering Water-Coloured Drawings more bright and permanent, by its use. The following Communications were received from him, and Samples of the article, also the Specimens of the Drawings mentioned, are preserved in the Society's Repository.*

SIR,

MR. Tomkins, a friend of mine, an eminent artist, about two years since discovered a method of freeing ox gall from its colouring matter, a thing of great consequence to artists in all delicate colours, as blues, purples, reds,

reds, &c. which are more or less tinged by the yellow colour in ox gall, as generally used. Should the Society of Arts deem it worthy of attention, he will disclose the process, which is by no means an expensive one.

I am, Sir,

Your most obedient servant,

THOMAS GILL.

St. James's-street, April 29th, 1812.

To. C. Taylor, M. D. Sec.

N. B. Samples of the colourless ox gall accompany this, which will enable the Committee to compare it with any other preparation thereof, or ox gall itself, as commonly used.

A Description of some of the Properties of the Refined Ox Gall, invented and prepared by Peltro William Tomkins, *Esq. Historical Engraver to Her Majesty, No.* 53, *New Bond Street, London.*

It possesses all the valuable properties of ox gall, as applicable to painting in water colours, with the superior advantages of being deprived of all tendency to putridity, and of all colouring matters.

It combines with, and fixes, all water colours, as they are usually prepared, either by being mixed with them, or washed over them after they are laid upon the paper, &c. It renders blue, purple, red, green, and all other delicate colours, more bright and durable; and, if a small portion of it be added to any of the colours, it causes them

them to wash more freely and evenly over the surface of the paper, ivory, &c.

Combined with gum arabic, it gives depth of tint, without any unpleasant glossiness upon the surface of the drawing, and prevents the gum from cracking, and the colours are so completely fixed in the paper itself, that subsequent tints can be washed over them without any risque of their becoming foul, or forming improper combinations with the under colours.

Combined with fine lamp black, and gum water, it forms a complete substitute for indian ink.

If it be floated over the surface of drawings, made with chalks, or black-lead pencil, it fixes them firmly; and they may then be washed over with any water colours, previously mixed with a small portion of it, without in the least degree disturbing the chalks or black-lead.

For miniature painting, being washed over the surface of the ivory, it completely removes its greasiness; and being mixed with the colours, it causes them to float freely thereon, and tints may be laid over tints, the colours being struck into the ivory.

For transparencies, oiled paper, being first washed over with the refined ox gall, and permitted to dry, water colours, mixed with some of it, will lie freely, and perfectly smooth upon it, and be so fixed, as not to wash up by the repetition of different glazings of colours, over each other, thus producing depth of colour.

In short, the valuable properties this refined ox gall possesses, makes it equally applicable to historical, landscape, botanical, and natural history painting, as well as to colouring prints in general; and, by its readily combining with all the vehicles used in the preparation of

water

water colours, and having no colour in itself, it enables the artist to paint with ease on surfaces otherwise unfavourable, at the same time rendering the colours more bright and durable.

Many other valuable properties will, no doubt, on trial, be found in this preparation; and the result cannot fail to facilitate and improve the art of painting, in water colours; and, as the discovery of it is entirely new, it will in all probability be found applicable to many other useful purposes.

P. W. TOMKINS.

May 20th, 1812.

Ox Gall,

deprived of its tendency to putridity, and its colouring matter, so detrimental to all delicate colours, is prepared in the following manner:—

Process.

To a pint of fresh ox gall, boiled and skimmed, put one ounce of allum, finely powdered; continue it on the fire until combined; when cold, put it into a bottle, and cork it moderately close.

To another pint of fresh ox gall, also boiled and skimmed, put one ounce of common salt, and continue it on the fire until combined; when cold, put it into another bottle, and cork it moderately close.

Gall, thus prepared, will keep perfectly free from putridity, or any offensive smell, for years.

When the above preparations have stood in a room, of a moderate temperature, for about three months, they will deposit a thick sediment, become clear, and fit for use in ordinary

ordinary purposes; but as they contain a large portion of yellow colouring matter, tinging blue of a greenish hue, reds, brown, and sullying purples, they are unfit for general use in painting in water colours.

Further Process.

THE before-mentioned preparations, after standing until become perfectly clear, are to be decanted and combined in equal proportions; a thick coagulum is instantly formed of the yellow colouring matter, which precipitates, leaving a clear liquid, namely, the colourless ox gall.

N. B. After the combination of the two first preparations, the process may be assisted by filtering the liquid through paper. Age renders this preparation more brilliantly clear, and by it, it seems to obtain an agreeable scent; nor has it been observed to contract, at any time, an unpleasant smell, or to lose its useful properties.

P. W. TOMKINS.

SIR,

HEREWITH I send you a certificate from Mr. Cosway, and Miss Jones, in testimony of their approbation of my refined ox gall; and likewise a farther description of its properties and uses in the art of water colour painting; together with a sketch made in black chalk, fixed by means of it, and afterwards washed over with water colours, also mixed with it, to shew that the chalk is so firmly fixed as not to mingle with the water colours in the least degree; and also a specimen, produced, with a mixture of fine lamp-black, and gum water: which, combined with a portion of the refined ox gall, becomes a complete substitute

substitute for the best indian ink; and which you will please to add in elucidation of my former communications upon that subject to the Society.

I am, Sir,

Your most obedient servant,

P. W. TOMKINS.

No 53, New Bond-street, May 20th, 1812.

To C. Taylor, M.D. Sec.

Certificates.

Miss Jones presents her compliments to Mr. Tomkins, and having made trial of his preparation for painting in water colours, she has found it fully to possess every property he ascribes to it, in its application upon ivory, as well as paper.

Mr. Cosway has also commissioned Miss Jones to say, that he has found the result of its trial in every degree satisfactory.

No. 127, *Mount-street, May* 19*th*, 1812.

To P. W. Tomkins, Esq. &c.

SIR,

Mr. P. W. Tomkins brought me, on Thursday, a specimen of clarified gall, describing it as possessing important properties, as applicable to painting in water colours, and desiring my opinion of it after a trial. I lost no time in making the necessary experiments, and, as the recent kindness of the Society to two of my children, had previously decided me to use every endeavour in my power

to

to assist and promote its objects, I have preferred to send my opinion to you, for the consideration of the proper Committee. Three of my experiments accompany this.

Mr. Tomkins stated his clarified gall to possess the property of laying water colours perfectly smooth on an oily or greasy surface; of considerably fixing such colours, whenever applied; and also of adding brightness, in all cases, without discolouring the purest blue and white. With a view to the first point, I gave the vehicle a severe trial, by using it with water colour, on an oiled paper, taking the mezzotint first, as is my usual practice. I found, in (No. 1), that the quantity of gall that could be employed with so deep a tone of colour, was not sufficient to counteract the oil; but, observing in the subsequent proceedings, that the colour flowed perfectly smooth where thinly applied, and that there was no effect, from the oil, wherever the colour had once passed and dried, I made the small sketch (No. 2) on the same oiled paper, washing it over first with the gall alone. I found this to answer, most perfectly, in removing the greasiness of the surface; and it also convinced me of the power of Mr. Tomkins's material, to fix water colours, by my having been able to wash over the small lines of ropes, of the vessel, in front, without the least disturbing the colour. This last I have regarded as an important desideratum in the use of water colours, and it led me to make the slight sketch (No. 3) to ascertain the other points asserted of his vehicle, by the inventor. I tried it, also, in the most difficult cases for painting on ivory; and I am confident, in stating to the Society, that it possesses all the properties Mr. Tomkins attributes to it; that the discovery will confer most valuable benefits on every painter in water colours,

colours, who is master of his profession; and that it is highly deserving the countenance of the Society.

I am, Sir,

Your most obedient servant,

W. Craig.

Charlotte-street, May 11th, 1812.

Sir,

Mr. Tomkins having, by desire of the gentlemen of the Committee of Polite Arts, referred to me to make trial of his refined preparation of ox gall, I have accordingly done so, and (allowing for the shortness of time since Mr. T. applied) have found it greatly superior to any I have hitherto used, and fully to possess the qualities described.

I remain, Sir,

Your obedient servant,

John Wright.

Burlington Gardens, corner of Old Bond-street, May 13th, 1812.

Dear Sir,

I am really ashamed I have not written before, to thank you for your present of the preparation of ox gall. I have used it in various ways, and find it answer my expectations perfectly, as to making colours flow pleasantly on any surface of ivory, though long prepared.

Its being so perfectly transparent makes me conclude, it may be used with safety with most colours; and I hope

it will answer the very purpose you wish it, as to not injuring the effects of them, which time only can ascertain.

With sincere esteem,

I remain, your's truly,

GEORGE ENGLEHEART.

Hertford-street, June 17th, 1812.

To MR. TOMKINS, &c.

DEAR SIR,

I TAKE the liberty of requesting, as a favour, a little more of your prepared ox gall; I find it so extremely useful, that I wish never to be without it. You desire to have my opinion of its qualities, as I have found them. I consider it possessing all properties of the gall, in its original state, with this great advantage, that by being rendered clear as water, it does not change or soil the colours; if any thing, it adds, I think, to their brilliancy; and the most valuable property it has, is of fixing the colours in the paper, and thereby preventing, in washing one tint over another, moving the under tint, this is an advantage highly important and valuable. In fine, I think, that as a medium for facilitating the use of water colours, it is a discovery which cannot be too highly valued. This, Sir, is my humble and sincere opinion of it.

I remain, Sir,

Your obliged humble servant,

JOSEPH PASTORINI.

Rathbone Place, March 4th, 1812.

MY

My Dear Sir,

Receive my sincere thanks for your kindness, in sending me a sample of your new discovered liquid, for painting in water colours, which I have used with success; and I purpose, when you make it public, to procure some for my own use, and shall recommend it to others, doubting not, that my brother artists will (as well as myself) find that it facilitates the execution, and adds brilliancy to the colours.

Believe me, dear Sir,
Your obliged servant,

P. Violet.

Upper James-street, Golden-square,
Feb. 26th, 1813.

To P. W. Tomkins, Esq.
New Bond-street.

Sir,

I have made several experiments with the preparation of ox gall left with me, by the desire of the Committee, and I find it to be extremely useful, not only in its causing the colour to lie smooth, on greasy paper, but on fixing colours that are apt to stir, on the immediate use of the sponge, by which means we can gradually diminish their depth, without losing all the force at once, or having the green colours of trees running over the skies, and mixing with the blue the moment they are wetted.

I am, Sir,
Your most obedient servant,

John Varley.

No. 15, *Broad-street, March 2nd,* 1813.

To C. Taylor, M. D. Sec.

SIR,

In conformity to the wishes of the Committee of Polite Arts, I send you two phials, containing the preparation of ox gall; likewise a sketch, made with black Italian chalk, fixed by means of it, and afterwards frequently washed over with water colours, in which I also put a small portion of it; and another specimen shewing, that the smoak of a common candle, caught on an earthen or glazed surface, and mixed with gum-water, and further mixed with my preparation of colourless ox gall, becomes completely fixed in the paper, and forms so complete a substitute for India ink, that the difference cannot be discerned. This composition does not require grinding; it lies perfectly smooth and transparent, and receives a wash of any colour over it, exactly the same as India ink, and cannot be washed off without destroying the surface of the paper.

I am, Sir,

Your most obedient servant,

P. W. TOMKINS.

To C. Taylor, M.D. Sec.

The

The SILVER MEDAL *and* TWENTY GUINEAS, *the Premium offered by the Society, in Class* 120, *were this Session adjudged to Mr.* WILLIAM TALLMACH, *Castle-street, Oxford-street, for a Bronze Cast, of Venus disarming Cupid. The following Communication was received from him, and a Model, executed by him, is preserved in the Society's Repository.*

SIR,

THE method used by me to produce the cast, which has been honoured by the Society's approbation, is the same which is commonly practised by metal casters, from a mould called a sand mould, to distinguish it from one which is sometimes used, made with brick-dust and plaster of paris.

The figure intended to be cast, must have what is usually termed bearings, fixed at the most convenient parts of it, for the purpose of supporting, at the time of melting, the core in the mold, so that the metal may run without obstruction.

Great care should be taken in placing the clay within the mold, that it be all of an equal thickness, which is not generally sufficiently attended to, so that the core, when suspended, is not in all parts equally distant from the face of the mold, which it ought to be.

The mold must be completely dry, and sufficient apertures made, all leading upwards, to permit the air to escape.

Various mixtures of metals are made for the purpose,

but that of the produced cast, was formed from brass and copper, but the greatest proportion of the former.

I remain, with great respect,

Sir,

Your obedient humble servant,

WILLIAM TALLMACH.

Castle-street, May 20th, 1813.

To C. Taylor, M.D. Sec.

Ten Guineas *were this Session voted to Mr.* Charles Wilson, *Worcester-street, Borough, for a Method of preserving Oil Paintings from decay. The following Communications were received from him, and a Specimen of an Oil Painting, thus guarded, is preserved in the Society's Repository.*

SIR,

I beg leave to submit to the inspection of the Society, an invention of mine to preserve oil paintings, by defending the canvas from decay, and which I hope will be found deserving of their approbation.

I remain, Sir,

Your humble servant,

CHARLES WILSON.

Worcester-street, Borough, March 16th, 1813.

To C. Taylor, M.D. Sec.

Mr.

Mr. WILSON'S *Process for preserving the Canvas in Oil Paintings, and repairing Defects therein.*

1st. SEPARATE the canvas from the pannel, or straining frame, and lay it on a smooth table, with the painting downwards, and nail it securely.

2nd. Take a piece of tin foil, larger than the canvas, place it on a very smooth table, and make the tin foil as smooth as possible with your hand. Then melt some Salisbury glue, in the same manner as for cabinet-makers use.

3d. Warm the tin-foil, before the fire, and lay it again on the table, then wash it over with the glue, and place it on the back of the canvas, secured as above, as quick as possible; smooth it perfectly with the hand, and let it remain in a warm room to dry.

4th. To repair the cracks of the canvas, in an old oil painting, lay it on a very smooth table, the subject downwards, then, with a brush or fine linen, cover the canvas with some melted white wax, and, with a warm flat smoothing iron, rub over the wax, and press it hard, which will draw the colours up to the canvas.

5th. To varnish the painting, clean the picture well, take some white wax, and spirits of turpentine, with a small quantity of linseed-oil, and sugar of lead; melt them over the fire, dip a fine linen rag therein, with which wash your painting; then, with a fine linen rag, rub over the varnish, till it begins to be polished; let it remain till next day, and then rub it over with a fine waxed cloth, and afterwards with a soft linen cloth, using them alternately, by which means the painting will receive a very fine polish.

By the above means, the cracks and small holes in old

paintings may be closed and repaired, and a coat of tin foil may be afterwards glued on the back of the canvas, as above-mentioned.

A foot square of the tin foil costs about sixpence; when wanted of a larger size it will cost considerably more in proportion. It may be procured in sheets of three or four feet if wanted.

FIVE GUINEAS *were this Session voted to Mr.* FREDERIC WILLIAMS, *Brown-street, Bryanstone-street, for an improved Painter's Easel. The following Communication was received from him, an explanatory Engraving is annexed, and an Easel, upon this Construction, is preserved in the Society's Repository.*

To the Society for the Encouragement of Arts, Manufactures and Commerce.

GENTLEMEN,

WITH a view to benefit an art I much admire, and having often experienced the want of some convenience in drawing scenery from nature, I have so improved the principle of the common easel, as to enable artists to escape the disadvantages to which they have been hitherto subjected. My improvement I call a *Portable Easel,* of superior lightness, utility, and simplicity, and which may be used as a walking-staff. In utility and ease it cannot be surpassed, as it will serve to take a picture of any dimension.

Referring

Referring this instrument to the candid consideration of the Society for the Encouragement of Arts, &c.

I am, Gentlemen,

Your most obedient

and devoted servant,

P. F. WILLIAMS.

No. 12, Brown-street, Bryanstone-square,
Oct. 27th, 1812.

N. B. An easel may be made of mahogany on an apparent lighter construction, and with additional elegance.

Reference to the Engraving of Mr. WILLIAMS'S *Portable Easel, for the Use of Painters. Fig.* 1, 2, *and* 3, *of Plate* 6.

THE object of this contrivance is, to render the easel more portable, for the convenience of artists when travelling in the country. This easel, when folded up, forms a square staff, shewn flat-ways in fig. 1, and edge-ways in fig. 2; the rails of which it is composed are kept together for the convenience of carriage, by brass hoops or caps *a a*, fixed on at each end; when set up for use it appears as represented in fig. 3, forming a very secure and steady support for the tablet or picture, represented by the dotted lines; it consists of three deal rods, or bars, A, B, C, the two former being the whole length of it, but the latter only two-thirds; the bars A and B, are united by a center pin, which also passes through one leaf of a brass hinge *p*: the other leaf being screwed to the short bar C, to permit it to be opened out from the others, to any distance, at pleasure. On the joint of this hinge, and

and the center pin, connecting the other two bars, the easel can be opened out, as in fig. 3, to stand in the most convenient position, for the support of the picture, and to suit the ground if uneven; the front legs, A, B, are pierced with a number of holes, for the reception of pins *b b*, by which two short ledges or rails, D, are held, so as to form a shift for the reception of the tablet; these rails, one of which is shewn separately at D, when the easel is packed up for carriage, are placed at the end of the short leg C, behind the others; the two smaller ends of them being received into a gap, made in the hinge, as is shewn at D, fig. 2: the brass hoop *a* containing them altogether; and in order to make the surface of the cross, against which the picture rests, flat or plane, two pieces of wood, *d d*, fig. 3, of the same thickness as the bars of the cross, are applied upon the limb B, which fit into two spaces *e e*, made in the limb A, when the instrument is shut up; and holes are also made in the bar D, for the two pegs, which support the shelf to pass through, and thereby to retain the bars A B, in any required extent of their opening; and the prop C may be also kept from moving by wire hooks, extending to it, from those bars. The whole instrument may likewise be rendered more steady, in the fields, &c. by forming the lower ends of the three bars into points, shod with iron, the better to enter into the earth; and which may be rounded off a little at their ends, so as not to injure the carpet, or floor, of a room.

Mr. Frederic Williams's Portable Easel.

Mr. A. Young's Ladder Fire Escape.

Fig. 2.

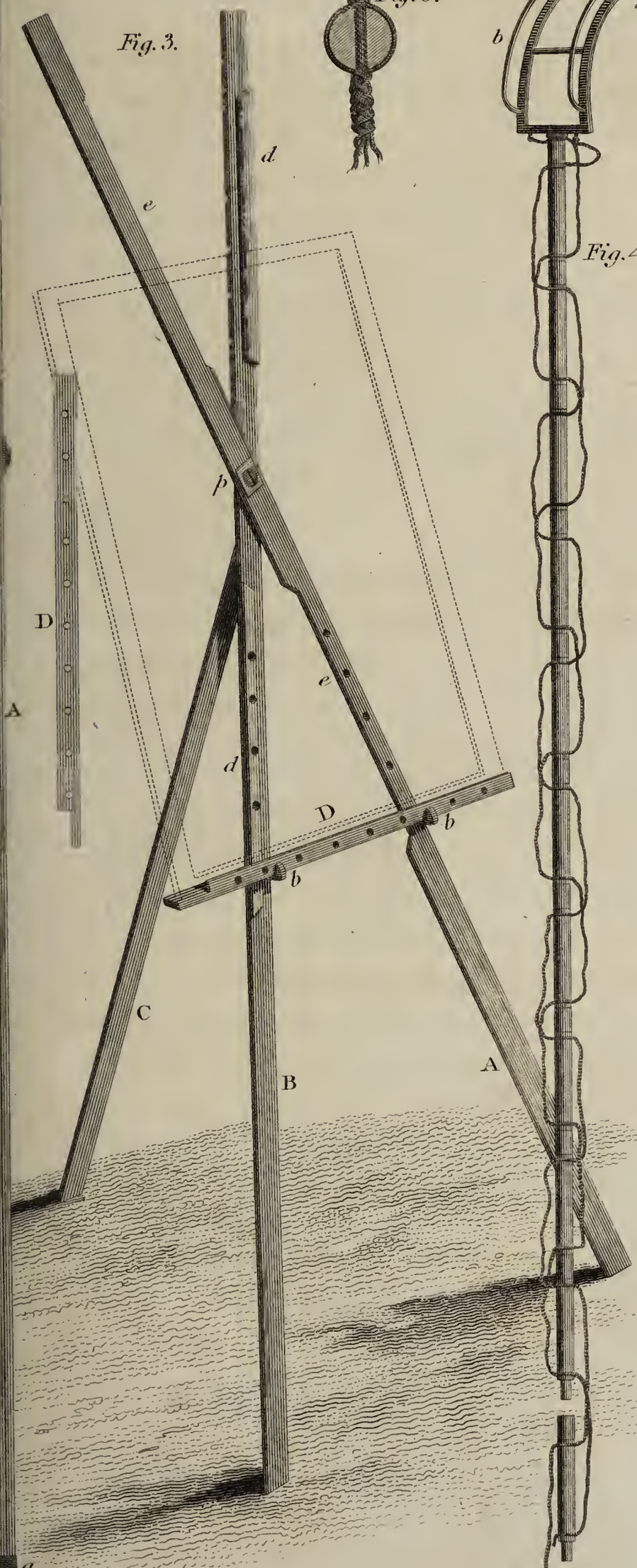
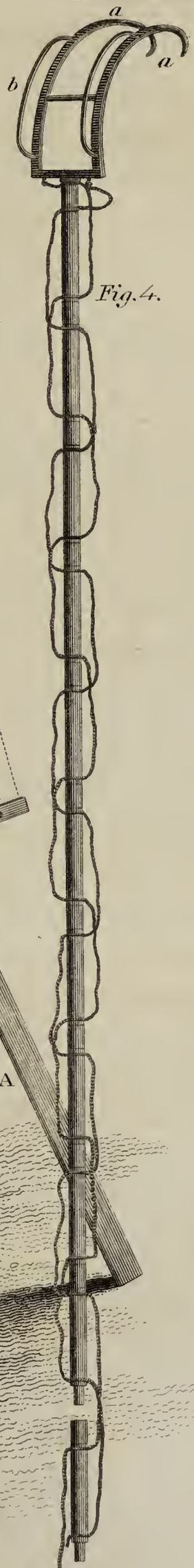
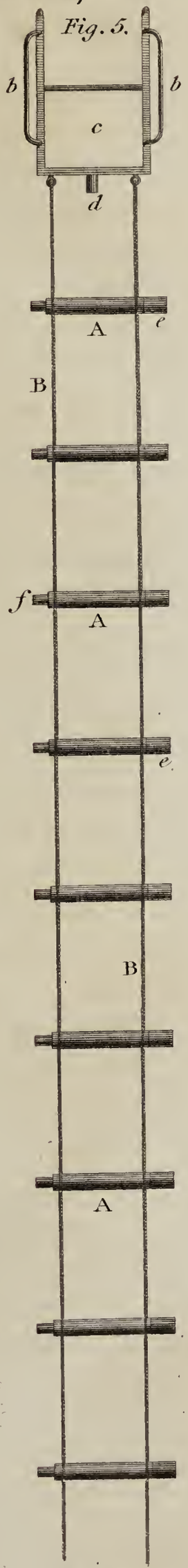


Fig. 3.

Fig. 6.





J. Farey delin.

E. Turrell sculp.

PAPERS

IN

MANUFACTURES.

The SILVER MEDAL, *and* TEN GUINEAS, *were this Session voted to Mr.* SAMUEL BARRALET, *Cole Harbour-street, Hackney-road, for an improved Shop-board, for Tailors, by which the Diseases are obviated to which this class of Men are particularly subject. The following Communication was received from him, an explanatory Engraving is annexed, and a Model of the Shop-board is preserved in the Society's Repository.*

To the Society for the Encouragement of Arts, Manufactures and Commerce.

GENTLEMEN,

I BEG leave to lay before you, an humble design, modelled according to the prescribed rules of one inch to a foot, a method, by mechanism, to work at the *Tailor's* business, either standing or sitting, with equal ease and dispatch,

dispatch, as the present mode, which is pretty generally understood to be very unwholesome, many thousands having fallen a prey to it in the present and past generations. Health being the greatest blessing that can be bestowed on man, it becomes the mind, ennobled by generous sentiments, and love to human kind, to study the promotion of this treasure; such, I trust, this system will appear to the world at large. I am not so sanguine as to suppose, that all tailors will adopt my mode, but as the means are very cheap, and it gains general knowledge, I hope that the rising generation will endeavour to establish it for the comfort, convenience, and, above all, for the health of every individual who practically fulfils his duty to the public in that branch of business; and when called for to more manly exercise, may be enabled thereby, with equal vigour and renovated strength, to perform his part. As a proof of what I advance, I have myself followed this method near nine months, and have found it of exceeding great benefit. I once laboured, from the inconvenience of working at the business in a fixed position, under the most excruciating aches and pains; and am happy in stating, that by the contrivance I allude to, I work day after day, and am entirely free from such distressing afflictions. I therefore recommend it, with confidence, to the attention of your Society, that it may, under their sanction and approbation, be brought into use among the numerous class of workmen who follow the tailoring business.

The model I do myself the pleasure of sending for your inspection, represents a tailor's board, 15 feet by 7 feet, being calculated to seat, comfortably, seven men, and in cases of great emergency, nine or ten. The four

square

square holes are the front seats of the window, to which is annexed two other seats for three people to work at one garment, a thing very common in this business, the cushion forming a triangle. The bevelled square hole, from the right hand corner, supposing one stand at the back edge of the board, being the most conspicuous, I have made the finished model for a man, standing, from four feet 10 to 5 feet high, all above that measure will not need such a stool. The side legs are morticed in three separate heights, as all the legs must be for the convenience of the men, which may be fixed higher or lower as required. The use of these feet-holes are for pressing. The tailor places himself upon the seat of the board, and rests his feet upon the tenon holds: puts the sleeve-board across his knees, having previously unscrewed his cushion and let it fall down close to the board: all which may be done in less than one second, and in as little time as fixing himself cross-legged; for he is obliged now to button his knees to fetch the iron, and again to unbutton them, and also his braces; but in this way he will always be ready, at any moment, to start and appear decent like other working men. The standing position is extremely easy; for instance, suppose the operator to stand in the hole, perpendicular, raising his cushion to the waistband of his small-cloaths, screwing it steady with his right hand, advancing his breast, for health sake, entirely throwing off the old plan of stooping, (to which journeymen tailors are all too much inclined) and only directing the head and eyes to the cushion, standing perfectly free and easy. The cushion pushed to the extent of the slide hole, and when tired of standing on one or two feet, resting each in turn on the stool. The operator can seat himself by a brisk

brisk spring, drawing the cushion after him with his right hand, and with his feet draw the stool, which is to be a moveable one, towards him, till he finds himself perfectly easy; all which may be done, when used to it, without knowing such a change has taken place.

I would recommend all tailors to stand as much as they can, and not to yield till their legs swell a little, then have recourse to sitting, till well used to it, when they may stand for many hours, it being most conducive to health, and the one posture is as easy as the other.

Having, I hope, fully explained the position of pressing and sewing, I wish next to shew how marking may be performed. The tailor must have a clear board, to lay his garment before him; he must unscrew the cushion, and draw it clear out, laying it aside till he has done fitting and marking, when he must resume it again. The three holes, at the back edge of the board, are so placed as to gain light between the front men. The candle-light system is the next thing to be considered: There are seven or eight men, and of course the same means are to be resorted to, of every man moving from his seat but two, to those round the candle-block, as will appear by referring to the model; each will gain the same light as in the present system. I judged it best to describe a board 15 by 7, as I have exactly ascertained the quantity seated, and their places. The trade being so numerous, it was necessary to trespass on your room, in order to show how all may be accommodated. I deem it unnecessary to have the sliding apparatus fixed to every hole, which must be when in actual use; as many as please may sit cross-legged, while others stand, so that cripples will not be rejected by this mode. Much more might be said in its favour,

favour, but I leave it to the judgment of every individual, and more especially to the good sense of the Society.

I am, Gentlemen,

Your obedient humble servant,

SAMUEL BARRALET.

No. 4, *Cole Harbour-street, Hackney-road,*
March 15*th*, 1813.

To the Society for the Encouragement of Arts, &c.

CERTIFICATE.

To the Chairman of the Committee of Mechanics, Society for the Encouragement of Arts, Manufactures and Commerce.

SIR,

WE, whose names are hereunto subscribed, waited on Mr. Barralet last night, to inspect the practical use of the Tailor's Shop-board invented by him, the model of which was exhibited to your Committee last Thursday evening; and after having minutely examined the same, and tried its operations in the various ways necessary for the sewing tailor, are of opinion, that its benefits would be considerable, if the invention was generally adopted, both for the ease and health of journeymen tailors; inasmuch as it prevents the compression of the lungs, and affords the means of at least three changes of position, which the present mode entirely precludes.

Should there be any defects in its present state, practical

tical experience will no doubt remove them, and suggest further improvements.

JAMES JACKSON, Bedford-street, Covent-Garden.

JAMES HOOD, Cork-street, Burlington Gardens.

JAMES M'KELLOR, Cecil-street, Strand.

WILLIAM CRAVEN, Cecil-street, Strand.

*** THE Society, aware of the great difficulties which all new inventions have to combat against prejudice in favour of any particular plan which had heretofore been adopted, feel great pleasure in stating, that Mr. Jackson has informed them, that the shops of *Messrs. Rutherford*, in Poland-street, have been fitted up after Mr. Barralet's plan; and that the health of the men so employed has, in consequence, been considerably benefitted.

Reference to the Engraving of Mr. SAMUEL BARRALET'S *Shop-board, to enable Tailors to Work either in a standing or easy sitting Posture, at pleasure. Plate 7. Fig.* 1, 2, 3, 4.

A A, fig. 1, represents a large table, 15 feet long, and 7 feet wide, with several apertures in it, for as many different workmen; and before each is a cushion, mounted on a stem, which is adjustible, in height and distance, to be most convenient for the work, which is pinned or laid upon it. At each end of the table four square holes are situated together, as marked at *a a a a*, and *b b b b*: and in the center, between them, is a hole for the reception of

of the stem of a candlestick *d*; see also fig. 4, which therefore serves all the four workmen. The cushions *e e*, are stuffed, and covered with cloth, being mounted on upright stems *f*, fig. 2; these pass through grooves in the table, and each is fitted through a piece of board *g*, fig. 2, which is situated beneath the table, and slides in a groove, formed by two pieces of wood *h h*, nailed fast thereto, and being rabetted to keep the board in its place; the stem *f* is at liberty to slide up and down, through the board *g*, and this, sliding along, allows the cushion to be set at any height above the table, or any distance from the workmen. In some parts of the board three workmen are placed together, as at *k k*, one cushion being placed between them; if they are all wanted to work at one garment, it is then made triangular, as fig. 3. In other parts of the bench are single standing places, as at *l l*; these are to be placed before the window, for day-light work, the four at *a a a a*, being situated so close to each other for the sake of the common light from the candle. The stem of the candlestick, fig. 4, is cut into a screw, upon which a round block *r* is fitted, and this carries the nozzles for two or three candles, which can, by turning the block round, be set at any required height. The workman may stand upright upon the floor, or, when tired of that position, may sit upon the edge of the table, and place his feet upon the foot stool *m m*: there are also four legs *n n*, surrounding the four holes *a a a a*, and in these mortises are made, for the reception of tenons, upon pieces of wood, which project a few inches; these are for the supports of his feet, when seated upon the table, so as to elevate his knees sufficiently to use the board, and hot iron, for pressing down seams. The holes have covers fitted into them, when they are not in use, so

as to make a large table, to cut out work upon, &c. As well as preserving the health of the workmen, there is no doubt they will be enabled, by this method, to work much more conveniently, by placing their work upon these cushions, than by the aukward and unhealthy mode of sitting cross-legged, on a shop-board, for the mere purpose of having their knees to support the work; though there is no weight or difficulty of holding it, to authorize such a position, as might have been urged in favour of the posture used by shoemakers, before the numerous contrivances which the Society have presented to the public were produced, which have been found to succeed so extremely well, in every respect, that such machines are now becoming very general in that trade. It is to be hoped the tailors will follow their example, for which they have every inducement; as the apparatus is of so simple a nature, and so trifling in its expense; and the advantages it promises, in health and ease, are so considerable, that they ought to effect the exclusion of the common method, which is little more to be recommended than that of the Chinese joiners, who, instead of using a work-bench, sit upon the ground, and place the board of wood against their belly, holding it with their feet, whilst they work it!

The

The SILVER MEDAL *of the Society was this Session voted to Mr.* JOSEPH DAVIS, *of Catherine-street, Strand, for a safe and economical Mode of burning Shavings, in Workshops, and converting them to useful purposes. The following Communication was received from him, an explanatory Engraving is annexed, and a Model of the Apparatus is preserved in the Society's Repository.*

SIR,

THE great number of manufactories destroyed by fire, in consequence of the large quantities of loose shavings, of carpenters, joiners, cabinet and musical instrument makers, &c. in the shops, the men not liking the trouble of burning them, in the common way, and it not being at all times convenient for the porters to remove them, they frequently accumulate to a dangerous extent, which was the cause of the fires at Messrs. Clementi and Co.'s, and at Messrs. Wilkinson and Co.'s, in Oxford-street.

To prevent such risks I have tried several experiments, and have accomplished a method which far surpasses my most sanguine expectation.

The machine, for the above purpose, is made of plate iron, one foot diameter, sixteen inches high, in a cylindrical form, with a flat top, having a round hole in it, the size of the cover for the stove on which it is fixed, that the cover may answer for both purposes. It has an iron handle, with ears like a pail, to take it off the stove with, when not wanted.

By this invention the shavings become a valuable fuel;

the work can be done much superior than by coals, and the risk of fire is in a great measure done away.

I shall be happy to shew any gentleman the improvement, in use at my manufactory, in Catherine-street, Strand.

I am, Sir,

Your obedient servant,

JOSEPH DAVIS.

Catherine-street, Jan. 12th, 1813.

To C. Taylor, M. D. Sec.

SIR,

Since I had the honour of waiting on the Committee of Mechanics, on Thursday last, I have endeavoured to ascertain the true merits of the invention, by farther experiments in the presence of a number of friends, and also of Mr. Gill, one of the Chairmen of the Committee of Mechanics, when the cylinder, 13 inches diameter, and 15 inches in height, being about 7-8ths filled with shavings, burnt for more than half an hour, and produced a degree of heat much greater than from coals.

Before I discovered this means of consuming shavings, the men, in the winter season, could not have the veneers, cauls, &c. ready in the work-shop in a proper state to be put together till the middle of the day, which may now be done in one hour; and in the evening it was necessary to make a very large coal fire at the time the men were leaving work, that being the time they generally completed their largest glueings for the day, in order that they might have the advantage of the night to set the work, to be ready the next morning to clean off. In using a coal fire, there is not only a great risk from the shavings

not

not being consumed, but lying about the shop, but the fire when put out with water in that state, often occasions the cast iron parts of the stove to crack: the cylinder removes the danger of the one, and the inconvenience of the other, as the men can at pleasure regulate the heat, or duration of it, by putting in the shavings; as, for example,—if the cylinder be one-fourth filled, it will give a strong fire for five minutes; if one-half, for fifteen minutes; if filled close, for three quarters of an hour; and when done with, the sweepings of the shop will remain burning, if not put out with water, for one hour longer. I have one now making on the plan of that shown in the drawing,—it will cost ten shillings, and with a little alteration may be applied to any stove where great heat is wanted, and if cinders or ashes be mixed with the shavings, it will burn (though not so brisk,) for several hours; but requires a little more attention to prevent it from smoaking, by keeping the pipe clear, and putting in small quantities.

I have stated the above particulars, conceiving they will be of great use to many manufacturers and others.

I remain, most respectfully,

Sir,

Your obedient humble Servant,

JOS. DAVIS.

Catherine-street, Strand,
Feb. 4th, 1813.

To C. Taylor, M. D. Sec.

Certificates.

We hereby certify, that we have seen Mr. Davis's invention in use, and consider it a great security against ac-

cidental fires in manufactories, by its consuming the shavings as they are made; that it is a saving of fuel, and a superior mode of preparing the work before it is put together.

Joseph Hammersley, cabinet-maker, Great Prescot-street.

George Astor and Company.

George Fryer, cabinet-maker, No. 30, Brydges-street.

William Stratton, stove-grate-manufacturer, Gutter-lane.

D. W. Harley, musical-instrument-maker.

J. W. Moore, ironmonger, Bridges-street.

John Abdey, organ-builder.

Jan. 12, 1813.

Reference to the Engraving of Mr. Davis's Stove, for Burning Wood Shavings, in Carpenter, Joiner, Cabinet, and Musical-Instrument-maker's Workshops.—Plate 7. Fig. 3.

The object of this contrivance is to employ shavings as fuel, instead of coal, by such a construction of the stove, that they will not blaze away too fast, as they do in an open fire, making an intense heat, but only of a momentary duration. This is effected by putting the shavings into a sheet iron cylinder, closed at top, which is fitted into the top of a stove, very similar to those always used in such situations for burning coals; and the flame produced by the shavings passed through flues conducted in

Mr. Sam.l Barralets Shop Board to enable Tailors to work Standing.

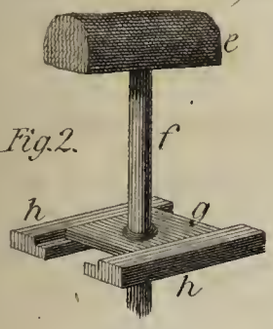


Fig.2.

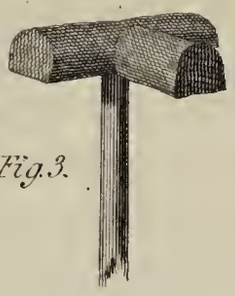


Fig.3.

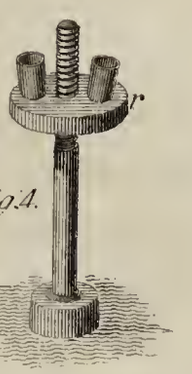
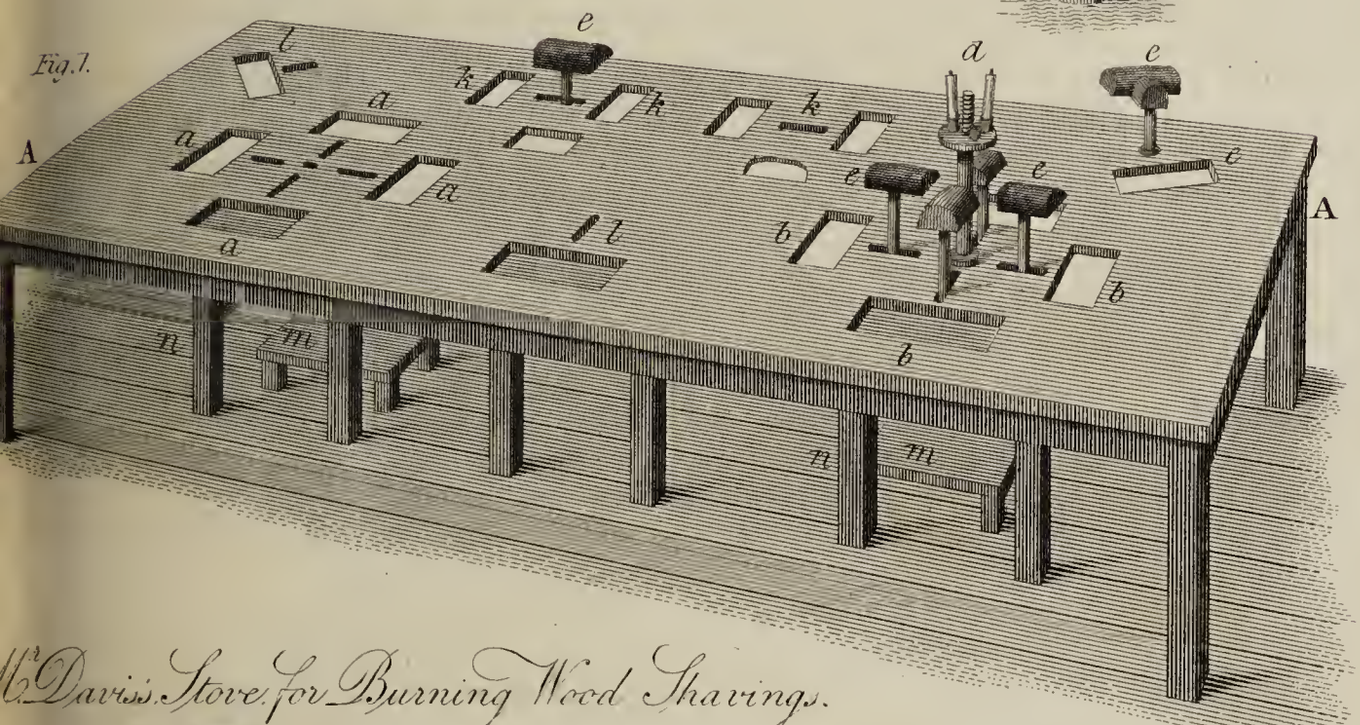


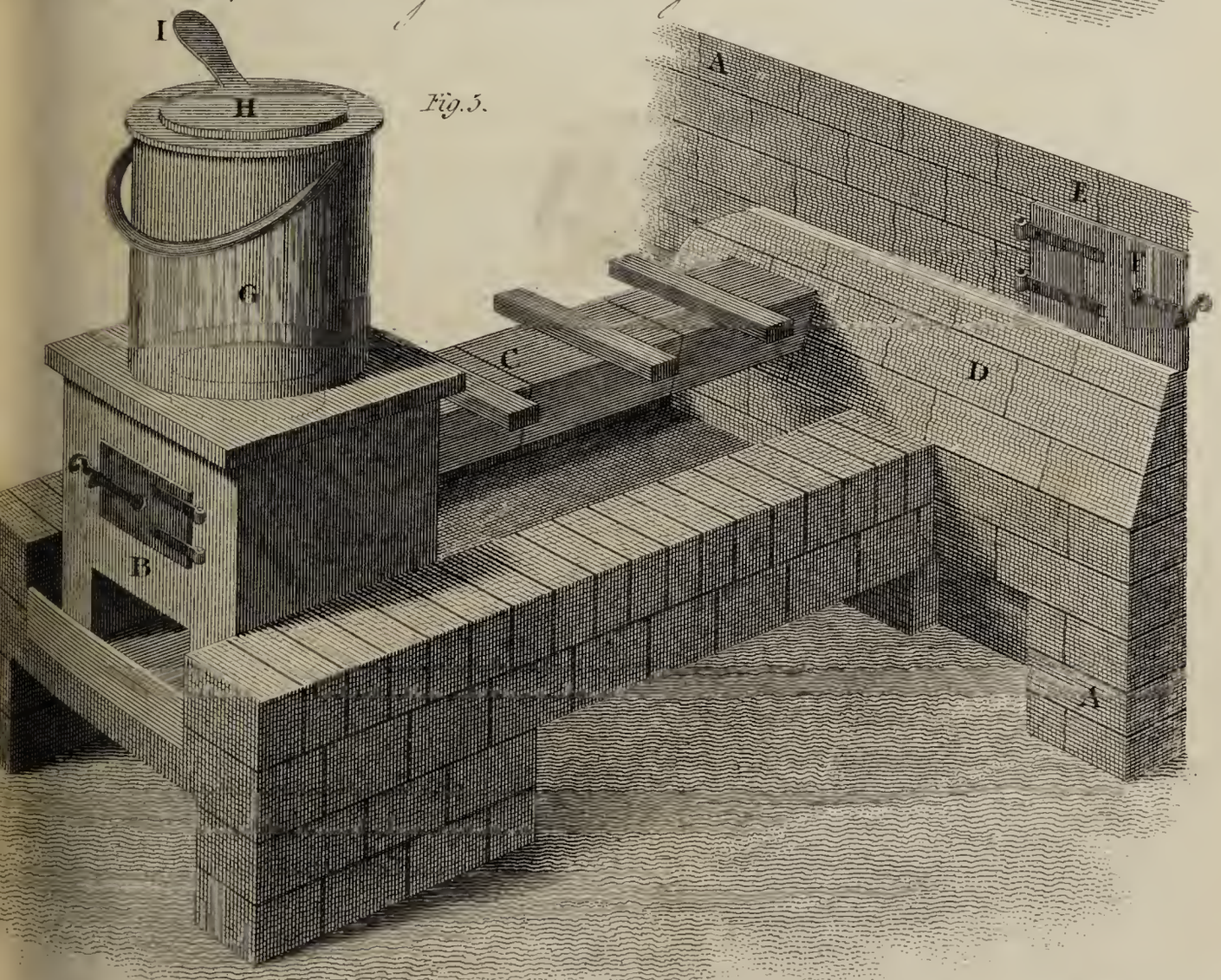
Fig.4.

Fig.1.



Mr. Davis's Stove for Burning Wood Shavings.

Fig.5.



wn by J. Farey.

Engraved by G. Davis

in the usual manner; the air which supports the combustion being supplied through the bars of the grate. Fig. 5 of Plate 7, is a perspective view of this stove, in which A A represents part of the interior wall of the workshop where the stove is placed.

B, the stove, which is made 12 inches wide, and 1 foot 3 inches high: it is of cast iron, and lined with fire tiles, having a door or fire-grate, with an ash-pit, beneath, in the usual manner; C, the sheet iron pipe, 6 in. wide and 4 in. deep, which conveys the smoke and flame from the stove into the brick flue at D, and this leads into the chimney at E; F is an iron door opening into the chimney, for the sweeping machine, or boy, to pass through, to sweep the chimney; G, the sheet iron cylinder, in which the shavings are put to be consumed, which is about 9 inches in diameter, and 16 inches high: it is placed over a circular aperture in the top of the stove B, and has a neck shewn by the dotted lines to fit in the hole of the top of the stove, to prevent the sparks of the shavings from flying out into the workshop. The cylinder is covered at top with a lid H, having also a neck, which is removed at pleasure by its handle I, to put in a supply of shavings; this fits very close, and as no air can pass by it, a sufficient draught to burn the shavings, but slowly, is afforded by the air passing through the bars of the grate, which is impeded by the ashes which may be therein; but this flame may be increased to a rapid combustion when necessary, by opening the door of the stove; the flame passes along the flues C and D, and gives out an equable heat to the room. Iron bearers are fixed across the flue C, which may be used to support any work which requires drying, or for any other purpose of this kind.

The supply of this stove with fuel from shavings, is

attended with so little trouble, and is such an advantage to the workmen, that they will always prefer burning the shavings to coals; so much so, that where 10 men are at work, there is a difficulty to collect shavings sufficient even to light the fire the next morning.

By this means, the danger of fire, which has been fatal to so many manufactories, is greatly removed; the loose shavings being consumed as soon as they are made, and that in lieu of more expensive fuel; and so slow are the shavings consumed, that the iron cylinder will hold enough, when crammed full, to supply the fire for upwards of half an hour. To guard the workshops still more effectually from danger, the stove and its iron flue is supported upon a mass of brick-work, which prevents any sparks, &c. from falling upon the floor; and the sides of the brick-work afford very convenient shelves on which to lay any wood-work that requires heating, drying, &c. and when a greater heat is required to extend to a considerable length horizontally, as, for instance, four or five feet, by merely putting a few shavings into the cylinder frequently, in place of filling it, they become converted into flame, which is carried the whole length of the iron flue, heating it uniformly throughout. No soot lodges in the flue, but merely light ashes, which can be easily cleared out from time to time, as may be necessary.

PAPERS

IN

MECHANICS.

The GOLD MEDAL *was this Session voted to Captain* JOHN PEAT, *of Bloomsbury-Square, for his Invention of a Temporary Rudder for the preservation of Ships from being lost at Sea. The following Communications were received from him; an explanatory Engraving is annexed; and a Model of the Rudder is preserved in the Society's Repository, along with additional Engravings on the subject.*

SIR,

I BEG to submit, through you, for the consideration of the Society for the Encouragement of Arts, Manufactures, and Commerce, a sketch of a temporary Rudder, invented and used by me on board of the ship Cornwall under my command, on my voyage from this country to Jamaica, in January 1811; which ship was engaged by the Transport Board for the conveyance of 14 officers, 200 privates, 7 women, and 4 children, to Barbadoes.

In lat. 44° 0′. long. 19° 30′. on my passage out, I encountered a very severe gale of wind with a heavy sea, which carried away my rudder, and the rudder braces on the stern-post: I was, therefore, under the necessity of fixing

fixing a temporary one from the best materials I had then on board. On reference to a plan of Pakenham's temporary rudder, I found it impracticable to fix a rudder constructed on his plan, on account of the heavy sea to which we were exposed. It was therefore absolutely necessary, for the preservation of the lives entrusted to my care, that I should set about the construction of a rudder, which could be brought to act in a heavy sea, or under any circumstances whatever. This, I am happy to say, I accomplished, after a progressive improvement of fifteen days, and found this machine, when substantially fixed, to act in every point with the same effect as the regular rudder. One of the great advantages of the rudder invented by me is, that it can be shipped and unshipped at pleasure with the greatest facility, and under any circumstances.

The Engraving No. 1, (left in the Society's Repository) is from a draft made by Mr. Lockwood, the master-attendant of his Majesty's Dock Yard at Barbadoes, who had an opportunity of witnessing the effect, having been aboard for some hours, when we were working the ship under all sail in sight of his Majesty's squadron lying in Carlisle Bay.

In the Engraving No. 2, (also in the Society's Repository) is an improvement introduced in the rudder, which I found it required on my passage from Barbadoes to Jamaica, which I made in six days. The improvement consists of an additional weight suspended on a jack-stay, which is necessary to be let down when going more than eight knots an hour.

At my request, a survey was held upon this rudder by the principal officers of his Majesty's Yard, and all the old masters of the ships lying at Barbadoes; who were unanimous

unanimous in their opinion that the same was a better rudder than could be procured at that island; and recommended my proceeding with the ship in that state to Jamaica, which I had no hesitation in doing.

I have had the honor to submit a sketch of this temporary rudder to the Honorable the Elder Brethren of the Trinity House, who were pleased to speak in high terms of the invention, and have subscribed for twenty copies of the above-mentioned Engraving for their use.

I am, Sir,

Your most obedient humble Servant,

JOHN PEAT.

No. 11, *Bloomsbury-square,*
Oct 24, 1812.

To C. Taylor, M. D. Sec.

SIR,

Being requested by Captain Peat to confirm and state the particulars of what I know respecting his invention of a temporary rudder, that he had made on board the ship Cornwall, then commanded by him when on a voyage from England to Jamaica.

I lament that I am not in London, where I have some papers whereby I could give dates of particular occurrences, which I stated fully in the Barbadoes newspapers on our arrival there. However, I recollect that it was on the night of the 3d of January, 1811, that the ship parted with her rudder, when it blew a perfect hurricane, and which continued, without any abatement, the succeeding day and night. When the storm subsided, Captain Peat devised a plan of making a rudder, with a spare fore-top-sail yard fixed over the stern, and by means of blocks

reefed

reefed on each side, it served as a kind of paddle. The first trial was not a successful one, for want of a sufficient weight to keep the paddle under water; but which was soon remedied, for I think that it was on the 10th of January the ship answered the helm, and we proceeded on our voyage, every day discovering some new improvements; inasmuch, that on or about the 16th, he fixed his helm to the wheel, and we proceeded the rest of the voyage without any interruption, unless it was by negligence of the man who steered.

So confident was I of the safety and utility of this new invention, that on my arrival at Barbadoes, I proceeded in her to Jamaica, when I might have gone in other conveyances, a distance of 1000 miles.

At Barbadoes, the master-attendant of the King's Yard proceeded to sea in the Cornwall, by directions of Admiral Laforey, for the purpose of forming an opinion of the new rudder. On his return to Carlisle Bay, he declared that he would have no hesitation to sail to the Pacific Ocean with the rudder. He took a drawing of it, which the Admiral was to send to the Admiralty Board.

This new discovery I cannot too much praise, as being the means of once preserving my life, and the fatigue and labour which Captain Peat endured in accomplishing this machine, had nearly cost him his, by a severe fit of illness brought on by anxiety and exertions. If Captain Peat can derive any benefit from the British Government for his discovery, and of which I have bore testimony, I will add to his merits, by stating his humanity in affording comforts to 220 recruits whom he had on board, together with their wives, who were in the most deplorable situation occasioned by the storm, when the ship was unmanageable, and it being necessary to throw

throw their beds overboard, many were sick, and received nourishment from Captain Peat's liberality.

I have the honor to be,

Sir,

Your obedient humble Servant,

JOHN RICHARDS.

Birmingham, Nov. 10th, 1812.

To. C. TAYLOR, M.D. SEC.

SIR,

IT having been represented to us by Captain John Peat, late commander of the ship Cornwall of London, in our employ, then engaged in the Jamaica trade, that he had submitted, for the consideration of the Society for the Encouragement of Arts, Manufactures, &c. &c. &c. an Engraving and model of a temporary Rudder, invented and used by him on his passage from this country to Barbadoes in January 1811, to which place he was conveying 235 of his Majesty's troops:

We consider that it would be doing Captain Peat a great deal of injustice, were we not to give him every credit due for so valuable and simple an invention, the efficacy of which has been proved by the distance run in so short a time, and the documents we have in our possession, with the information received from many experienced nautical men of great respectability, who were aboard at the time, and had an opportunity of witnessing the great ease with which the vessel was steered on the different points of sailing under all sail, and from the high terms with which it has been spoken

of

of in this country by nautical men of the greatest experience and respectability, cannot fail of being of great utility to the public, and we consider that great praise is due to Captain Peat for his perseverance and daily improvement in substantially fitting the machine, from the idea which first suggested the construction of it.

We have the honor to enclose a letter received from Mr. Lockwood, of his Majesty's Naval Yard, Barbadoes, accompanied with a sketch from that Gentleman on the subject.

We have the honor to be,

Sir,

Your obedient humble Servant,

THOMSON, OSBOURNE, and Co.

Billiter-square, Nov. 12th, 1812.

To C. TAYLOR, M. D. SEC.

GENTLEMEN,

I HAVE the honor to forward a sketch of the temporary Rudder, by which Captain Peat governed the Cornwall to this island.

The apparent ease with which the ship reached this anchorage, the direct course she made under a press of sail, even studding sails, and the account of its action, led me to investigate the circumstance minutely, and enable me to speak very confidently of its properties; and, in order that you may have yet more information than I have time to write, I inclose the sketch with a Barbadoes paper. It

was

was my first intention to send the plan to Mr. Robert Blachford, Chartseller, Minories, for immediate impression, and to propose giving him a right or title to the plan, by sending me 200 copies. Captain Peat suggested the idea of my sending it to you.

I therefore, Gentlemen, beg your acceptance of my humble labor; my sole wish was to render it public for the good of society, as in my opinion it not only supersedes Pakenham's rudder, which stands in such high repute, but every attempt of that nature hitherto made, and reflects the highest credit on Captain Peat for his progressive improvement upon the rude idea that first presented itself.

I have the honor to be,

Gentlemen,

Your very obedient humble Servant,

Naval Yard, Barbadoes, Feb. 18, 1811.

To Messrs. THOMSON and Co.

A. T. LOCKWOOD,

Late Master R. N.

Master-Attendant of Barbadoes Naval Yard.

Opinions

Opinions of Officers in his Majesty's Royal Navy, respecting Captain Peat's Temporary Rudder.

Captain Losack, of H. M. R. N., thinks that the simplicity of Captain Peat's temporary rudder is its great qualification, and never saw any thing so good under every circumstance; that it can be shipped in cases where Captain Pakenham's cannot; that few merchant-ships have spare caps; that every merchant-ship has the materials to form Captain Peat's rudder; that Captain Peat's method is much superior to that which was adopted by Mr. Nicholson, described in his *Treatise on Practical Seamanship*, and as used by him for the Grafton and Elizabeth.

It appears to Captain Losack, that with Captain Peat's rudder a ship will tack, but not with the rudder described by Mr. Nicholson, which is a matter of great consequence.

Captain Hanwell, H. M. R. N. is of opinion, that Captain Peat's invention can be executed by any merchant-ship, and readily shipped in any weather; that Captain Pakenham's rudder cannot be so shipped; that he has no doubt of a ship tacking with Captain Peat's temporary rudder. He adds, that he agrees generally with Captain Losack in the observations made by him.

Captain Jackson, H. M. R. N., thinks Captain Peat's temporary rudder has much superiority over every other invention for the purpose that he is acquainted with; that it

Capt.n Peat's temporary Ships Rudder.

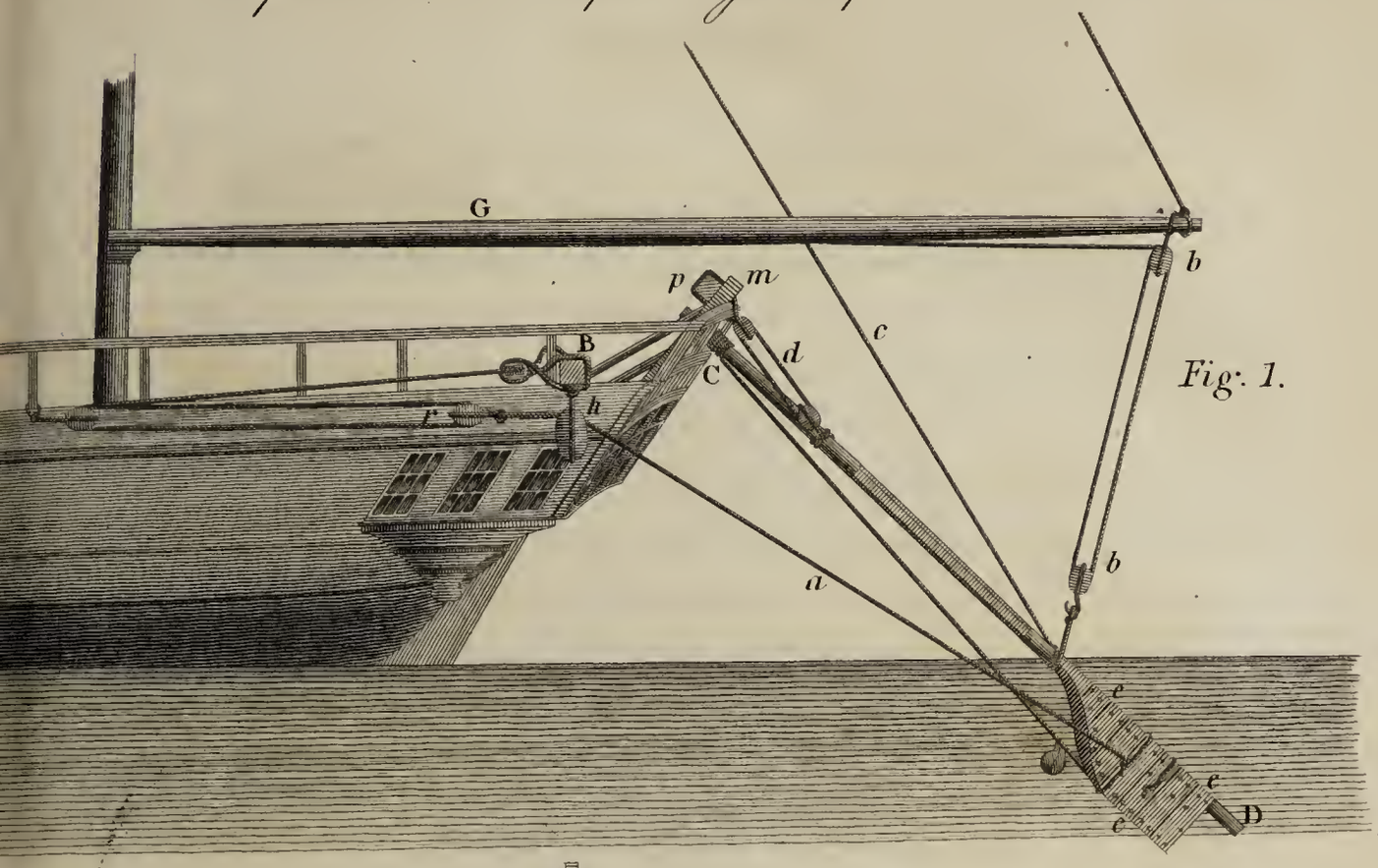


Fig. 1.

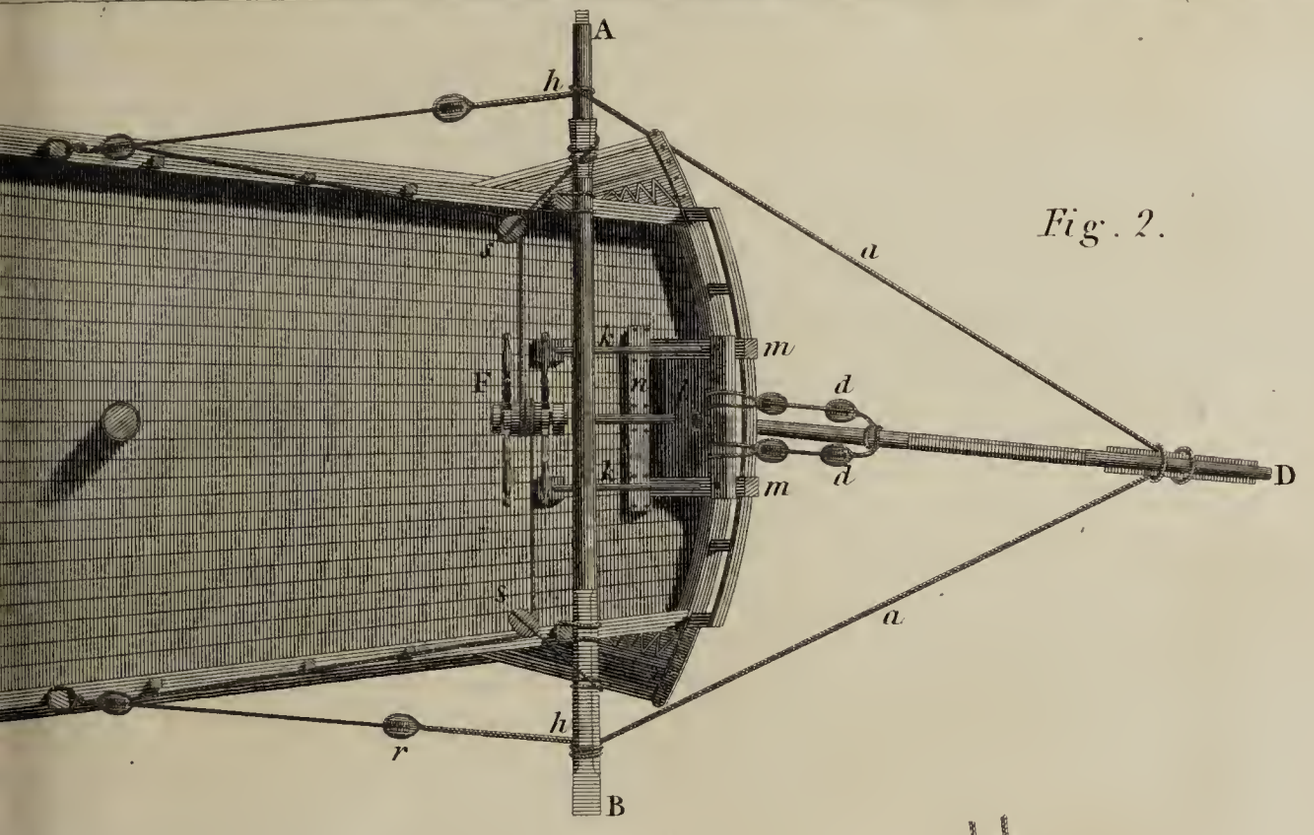


Fig. 2.

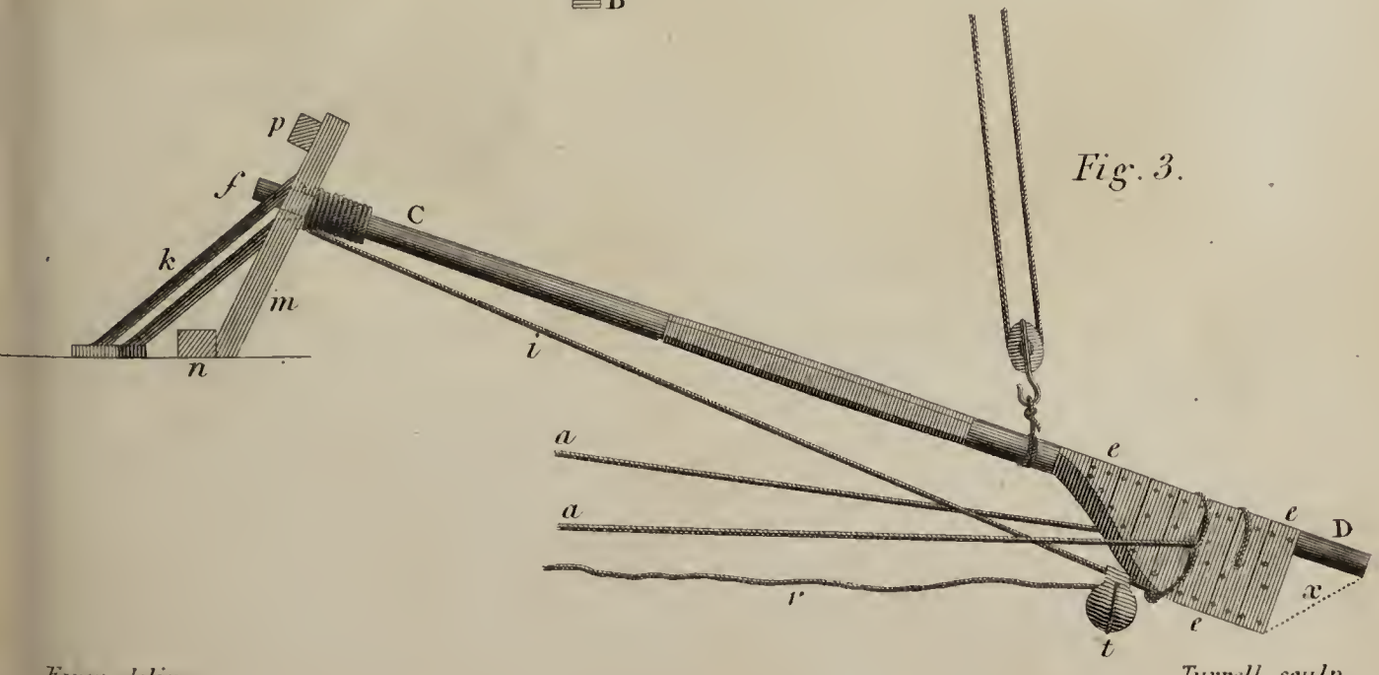


Fig. 3.

it possesses great simplicity, and that ships of all descriptions have the means of constructing it.

That in cases of heavy sea and bad weather, he is of opinion that it may be more easily applied than Captain Pakenham's rudder, but he thinks Captain Pakenham's rudder superior when once applied.

That Captain Peat's rudder appears to him more generally applicable to merchant vessels and small ships of war than to ships of the line; that he cannot judge with precision of its power, from not having seen it in practice, but he believes it can tack in all common cases.

Narrative of a Voyage in the Ship Cornwall from Portsmouth to Barbadoes, and from thence to Jamaica; together with an Account of the Loss of her Rudder, and the Invention of a Substitute; and the progressive Improvements thereon, the manner it acted, and the state of the Weather at the time. Extracted from the Log Book.

HAVING taken on board 225 troops for a passage out to Barbadoes, we weighed anchor on Saturday, the 29th of December, 1810, and made sail with a fair breeze at N.E. in company with the ship Cæsar, Jonathan Fowler, commander. On the 30th we were joined by the ship Posthumus.

We carried a fine breeze at east and south-east until the 3d of January, when at 3 P. M. the wind drawing round to the southward, and having the appearance of boisterous weather, we double-reefed the top-sails. At 4 P. M. very squally, brought the ship under close-reefed

topsails and courses, a heavy sea getting up. At 6 P. M. battened all the hatches down. At 8 P. M. the wind increasing, split the main-top-sail, and we shipped several seas over the weather gangway.

The wind having shifted to S. S. W. blowing a perfect gale, with a heavy sea rising; at 9 P. M. we took in the topsails and courses, and hove-to under the storm stay-sails, and struck top-gallant yards and masts. At midnight we had very squally bad weather, and a heavy sea running.

At three-quarters past 2 A. M. a heavy sea struck the ship under the counter, which carried away the tiller, breaking short in the rudder-head. We got relieving tackles on, and chocked the rudder up as well as we could (for there were no proper chocks fitted), and the carpenter was under the necessity of chiselling the broken part of the tiller out of the rudder head.

At daylight we observed the two uppermost of the rudder braces under the counter were nearly off the stern-post.

At 7 A. M. the rudder broke adrift from the stern-post below, hanging only by the upper pintle on the rudder head (the ship steered on the upper deck). The great sea that was running occasioned the ship to labour and pitch very heavy; the rudder in consequence having so much play, began to shake the stern-post, and tear away the counter. We got a purchase on the rudder, with an intention of heaving it up to clear the upper pintle which it hung by, and then to cut it adrift; but at that moment the rudder received another shock by a heavy sea, which broke it short off under the counter: the lower part dropping astern, we hove the upper part up, and cut it away, going altogether clear of the stern frame.

At

At 8 A. M. a tremendous sea running, the wind backing round to the south-east. Hazy weather, and no ship in sight.

At 11 A. M. saw a ship in the S. E., distance about six miles (supposed to be the Cæsar); hoisted signal of distress to her, but not perceived.

At noon, in lat. 45° 48′, long. 18° 10′, the gale still continuing, the ship labouring very much, and making a great deal of water, all the hatches were battened down, and the dead-lights in all the windows. This day no provisions could be served out to the troops.

On the 4th of January, the gale still continuing, with a great sea running, and the ship labouring in the trough of the sea very much, we set the mizen-top-sail close reefed on the cap, to keep the ship closer to the wind, having no storm mizen. Towards night the gale increased at S. E., the ship's head to the southward and westward. In this dreadful situation we were left without any ship in company, and 263 souls on board; it then became absolutely necessary to have recourse to some expedient for governing the vessel.

Having examined carefully a book of naval tactics I had in my possession, I found a plate of Pakenham's temporary rudder with the description accompanied, which gave me some little hope of success: but on further investigation, it appeared to me quite impracticable to ship a rudder on that plan, if we had succeeded in fitting it, owing to the heavy sea that was running; besides which, I had no spare cap on board, and as we steered on the upper deck, the sea must have been perfectly smooth to succeed in getting the rudder-head up the case without materially injuring the counter.

It was at this time one of the seamen represented to

me, that he had been on board a Turkish frigate in a similar situation in the Mediterranean Sea, and they managed to steer the ship tolerably well under her head sails, by means of a machine placed over the quarter or stern of the vessel (he could not recollect which), but it was made from a spare spar, with a gun-carriage fixed to the end of it.

I immediately ordered the spare top-sail yard to be got aft, and the carpenter was directed to get some 3-inch oak plank, intended as a substitute for the gun-carriage; with which to form a case, by nailing it on each side of the topsail-yard, leaving about two feet of the end of the yard clear, making it about four feet long and three feet deep, secured together, first on the inside with inch plank nailed the contrary way, having a piece of three-inch oak about one foot in depth placed on the inside of the lower end of the case, to which the planks were well nailed, and the bottom part of the case leaded over, having about 28lbs. weight to keep this part of the machine down in the water. Two guys were fitted round the topsail yard, about two feet above the case of the machine, to be brought on the quarter-deck from each quarter, to keep the machine steady,—the seaman referred to having represented they had steered in the Turkish frigate with tackles on the inner end of the spar.

Towards noon, notwithstanding the ship was straining and rolling very much, we were getting on fast with the machine. It blowing very strong gales from S. E. the hatches were still kept down, and no provisions could be served out to the troops. We saw a ship in the S. E. about six miles distance, scudding under her foresail. Hazy weather this day, and frequently pumping ship.

On

On the 5th of January we had fresh gales with a heavy sea. We finished our temporary rudder, and got it over the stern, which we did with greater facility by means of a tackle on the end of the spanker-boom. This tackle became of the greatest service to us afterwards in getting the machine in and out, and in the event of tacking or being taken aback, to prevent the machine from going under the ship's counter. We found it impossible to steer by the tackles on the inner end of the machine, which came on the quarter-deck over the stern. Although there was at this time a very heavy sea, I ordered the machine to be hoisted up, and launched on the quarter-deck, to make some alterations which then became absolutely necessary. The gale was abating a little, but the ship rolled very much. We set the top-sails close reefed to steady her.

We were proceeding with our improvements on the temporary rudder, and as I found it necessary to steer by this machine from the outer end, and to have out-riggers on each quarter, with blocks at the ends to receive the guys or pendants through, which were fastened round the spar two feet above the case. For the out-riggers, I ordered the spare top-mast to be laid across the afterpart of the quarter-deck, and lashed on each side to the timber heads, the ends of which projected about 12 feet outside of the quarter where the top-blocks were lashed for the rudder guys to reeve through. The ends of the guys were made fast to luff tackles hooked on to a strap round the mizen-mast, and the inner end of the machine was steadied by lashings to the midship ring bolts of the stern stantions.

On the above plan, we had great hopes that we should succeed in getting the ship's head round on the other tack,

and all hands were employed in making the necessary alterations. At 11 A. M. saw a ship in the S. E. quarter standing to the W. S. W. We made all possible sail to endeavour to cut her off. At noon we were about six miles distant from the ship. The weather was more moderate, and some of the soldiers came on deck for air. The ship still continued to make a great deal of water, which it is supposed arose from the nail holes of the rudder braces, and the stern-post being strained.

On Sunday, the 6th of January, we had fresh gales and hazy weather. We hoisted a signal of distress to the strange ship. At 1 P. M. the stranger standing towards us, we took in the head sails, and hove-to under the fore and main-top-sails.

At half past 2 P. M. the ship passed within hail to leeward, wore round, and hove to at a considerable distance. We repeated the signal of distress to him again and again, accompanied with guns, but it was not till half past 3 he filled his top-sails, and passed to leeward. The sea was too rough for a boat to be sent on board, but we implored him to stay by us, or tow our head round to the westward (the wind having backed to the N. E. and we were lying up E. S. E.); but although the commander of this vessel was aware of our loss, he made sail from us at a quarter past 4 P. M. to the great mortification of every soul on board, without learning whether we were in a leaky state or in want of any supply, or where we were destined to. I have since found that this ship was named the Sally, and commanded by George Knebly, belonging to Liverpool, and bound to St. Kitts.

The rudder was finished at 9 P. M. and we got every thing in readiness to launch it on the following morning; but at daylight we made some further improvements on the

the plan, and tried to wear ship with the stern cable and assistance of the head sails, but without effect.

On the 7th of January P. M., although there was a very heavy swell of sea running, we got the rudder over the stern; set all the head sails, and wore ship, to the inexpressible joy of every soul on board. We let the first reef out of the fore-topsail, and set the jib to assist the steerage, having at this time eighteen men employed at the luff tackles to steer; and, indeed, she did exceedingly well under the head sails and close-reefed main-top-sail within one point of her course each way, and going the whole 24 hours 7½ knots per hour.

The wind abating, and the sea going down, we made more sail; the hatches were opened, and the dead-lights taken out. This day provisions were served out to the troops.

The ship made less water. We made additional securities to the stern frame. Latitude at noon 40° 57′, long. 18° 24′. The distance run this day, 176 miles.

On the 8th of January, we had fresh breezes, the sea going down. The machine answered the purpose. Set all the reefs out of the top-sails, and set the main-sail; straining less, and making but little water. Distance run 112 miles.

On the 9th of January we had moderate breezes at N. W.; the swell was going down. The temporary rudder answering very well, but we were still employed in making some further improvements. During the night we carried easy sail. At 10 A. M. lowered the boat, and examined the ship; found the counter and stern frame very much shattered, aud the rudder braces off the stern-post. Lat. 38° 8′, long. 19° 0½′.

On the 10th of January we had light winds from the

westward; making additional securities to the inner end of the machine. At 7 P. M. tacked ship, the wind variable. At ½ past 7 we were taken aback by the sudden shifting of the wind to the N. W. We found the ship to answer the steerage as well as with the proper rudder. At 9 A. M. saw a strange sail in the N. E. quarter.

On the 11th of January we had light airs from the westward. At 7 P. M. spoke the American brig Isabella, from Cork, bound to Philadelphia. At 6 A. M. wore ship to the southward, answering the helm very well. Owing to the necessity of having from 15 to 25 men constantly at the luff tackles to steer, I this day formed a plan for taking the purchase used for steering to the wheel; at the same time having in contemplation several other improvements on the rudder. At 9 A. M. hoisted the rudder in for that purpose. I have to remark, that ten hands can take the rudder in, and launch it on the deck in the space of three minutes without the least risk of injury. The carpenter was employed in making some additional securities to the two middle stern stantions, by adding to them on the inside a frame made of oak, which was filled up with two pieces of 4-inch oak plank, with a hole made in the centre, which was to receive the inner end of the machine about one foot in. The whole of this frame was shored up from the deck, first nailed and bolted to the stantions; one of which was broken, and was the cause of making this false frame. The machine had a sort of shoulder formed at eighteen inches distant from the inner end. This shoulder was made by cutting up two capstern-bars, and making cleats about eighteen inches long, nailed and well moulded round the top-sail-yard as before stated, about eighteen inches distant from the inner end; which would act in the socket, when leathered and well greased,

ed, with perfect ease, chamfering or cutting-away the outer part of the socket, so as to give the machine sufficient room to work from side to side in tacking or wearing (in which case it required to make an angle of only 12 degrees, instead of 45, which the regular rudder is supposed to do) or up and down by the ship pitching in a heavy sea; and for the greater security of keeping the inner end of the machine firm in the socket, we had two gun tackles fixed on each side of the machine, about eight feet down from the socket, fastened round the taffrail and false frame. The guys or pendants, which were fitted on the machine two feet above the case, were now fitted round the spar in the centre of the case, by cutting two holes through for that purpose.

On the 12th of January, at 8 P. M. the machine being completed, we got it over the stern, and found, to our satisfaction, the machine acted with greater effect. At 10 P. M., brought the tackle falls to the wheel, and found it answer very well, steering with two men at the wheel, the same as with the original rudder. I must here observe, that had it not been for the assistance received from the troops under the command of Captain Cameron (who was at all times desirous of rendering any service in his power), I am convinced that our crew would have been exhausted by fatigue, from the constant attendance required at the steerage, until we brought the tackle fall to the wheel; added to which, the attendance required at the pumps. During the whole of this day we had fresh breezes at west.

On the 13th of January we had moderate breezes at N. N.W. a heavy swell from the northward. This day we set the head studding sails for the first time.

On the 14th of January we had light breezes. The ship

ship did not answer her helm owing to the heavy swell from the N. E.

On the 15th of January we had light airs. The ship did not pay attention to the rudder owing to the heavy cross swell. At 4 P. M. we got the rudder in, and added a piece of wood to the fore part of the case, and covered it over with two-inch plank, well nailed; one end of the piece being fitted into the case. This lengthened the case, at the top part adjoining the spar, two feet, reducing it entirely at the lower part of the case, which was chamferred off sharp, and leaded, as it required more weight, which made a sort of cut-water or stern to the machine; which being brought close to the spar, prevented it catching any wreck, or any thing else we might fall in with at sea, or in rivers, or roadsteads; when working ship it would prevent any ropes or cables catching it. At 4 P. M. we got the rudder again over the stern, and found it greatly improved. At 8 P. M. set all the studding sails, and got the royal masts up.

On the 16th of January we had moderate breezes; carried all studding sails, but not having yet sufficient confidence to carry them at night, took them in at 6 P. M. At 6 A. M. set all the studding sails again. Towards noon very squally weather, when we took in the studding sails. Lat. 31° 50′, long. 22° 5′.

On the 17th of January we had a strong breeze from S. E., and very squally weather. In order to prevent the ship coming up in the wind, during heavy squalls, we took-in some of the after sails, the main sail, and mizen top-sail. At 6 A. M. a strong breeze, but steady; set main sail, mizen top-sail, and top gallant studding sails, steering very well.

On the 18th of January P. M. we had frequent heavy squalls,

squalls, the ship occasionally coming up to the wind from W. S. W. to S. W., and S. W. by S. We were then obliged to take in the after sails, but carried the fore top-mast studding sail all night. Strong winds at S. S. E. Lat. 29° 34′, long. 25° 52′.

On the 19th of January we had fresh breezes at S. S. E. The ship having the mizen top sail and main-sail set, and requiring a great deal of weather helm, (going 6½ and 7 knots throughout the 24 hours); we were obliged at 8 P. M. to ease the ship of the after sail. During the night we had frequent heavy squalls. At 10 A. M. got the rudder on board, and added more lead to it; the carpenter employed in making some further improvement on the machine. The ship steered herself very well by attending to the main sheet and mizen top-tail. Lat. 28° 38′, long. 27° 53′.

On the 20th January, at ½ past 4 P. M., the rudder being again in readiness, it was got over the stern, and we made all possible sail, it now steering much better than before. At day-light (a fine breeze at S. E.) saw two brigs in the S. W. with the starboard tack aboard. We made signal to speak, supposing them to be bound for Europe. At 8 P. M. spoke the brig Faith, from Buenos Ayres, bound to London, out 56 days; sent letters on board; and at ¼ past 9 made all possible sail, steering very well indeed, going 7½ knots.

On the 21st of January we had strong breezes at S. E. In the day we carried all sail, the ship occasionally coming up to the windward of her course two points, but going seven knots throughout the 24 hours.

On the 22d of January we had strong breezes at E. S. E. We found the ship occasionally coming up to the wind, when all sail was set. It being on the quarter, I attribute it,

it, in a great measure, to the trim of the ship being materially altered, by using too much water from the after hold, and the whole of the provisions being used from aft. We also found the machine to require more weight when going with great velocity through the water; for in going seven or eight knots it nearly trailed on the top of the water, instead of being in the water three or four feet, when going four, five, or six knots. At 8 A.M. got the rudder in, and added more lead to the lower and fore part of the case, and sent a gang of hands into the fore hold to pump water off the casks aft. At 11 P.M. the machine was once more got over the stern, and found to steer much better, bearing a great deal of after sail. Lat. 25° 56′, long. 34° 17′.

On the 23d of January we had strong winds at E.S.E. going seven knots. Took in the mizen-top-sail to assist the steerage. During the night very squally and strong breezes: the ship occasionally coming up from W.S.W. to S.W. At day-light a heavy sea running, the machine acting with great effect, under easy sail, going upon an average seven knots. The carpenter was employed in making a spare machine out of the derrick, with some further alterations. At noon strong trades, with a great deal of sea running. Lat. 24° 32′, long. 36° 5′.

On the 24th of January we had strong breezes at E, with a great swell from the S.E. At 8 A.M. observed the inner end of the machine had forced its way between two and three feet further through the socket of the frame in which it acted, and found the ship steered much better in consequence. Secured the cleats in their then position, and made all sail possible fore and aft, the ship requiring two hands at the wheel, but steering remarkably well; in consequence of which we declined proceeding with the

other

ether rudder, as intended; going upon an average seven knots.

On the 25th of January we had strong breezes at East. Royal and studding sails, main-sail, spanker, and all sail set; the reefs out of all the top sails, and the ship steering very well, and required to be pumped only twice in twenty-four hours. Lat. 22° 18′, long. 40°.

We now considered the machine to be as complete and firmly fixed as it possibly could be, carrying all sail day and night. From this time until we made the island of Barbadoes nothing material occurred, which was on Sunday the 10th February, at ½ past 11 P.M., bearing West four or five leagues distance. Moderate breezes at E.N.E. Took the studding sails in, and hauled to the Northward, under easy sail. At 4 A.M. wore ship to the Southward. At day-light the S.E. end of the island bore S.W. At noon sailing along the island, distance five miles. At 2 P.M. took in studding-sails, and hauled up for the shipping in Carlisle Bay, and anchored in eight fathoms water. Found lying there His Majesty's ship Dragon, of 74 guns, Rear Admiral Sir F. Le Forey, with three frigates, seven brigs, and four schooners, and about ten sail of merchantmen.

On the 11th of February, at 8 P.M. waited on the Admiral to acquaint him of our situation. Several gentlemen of the navy, and from shore, came on board to inspect the machine.

On the 12th of February we disembarked all the troops, government stores, and water casks. A survey was held on the ship by three gentlemen from the dock yard, viz. Mr. Ward, the master builder, Mr. Lockwood, the master attendant, and Mr. Cruso, the Admiral's carpenter, and two masters of merchantmen; who unanimously recommended

mended the ship to proceed on her voyage to Jamaica, with the temporary rudder, without any alteration whatever: which survey has been attested, on oath, at the Notary's office.

On the 13th and 14th of February many persons came on board to inspect the machine. Mr. Lockwood, the master attendant, came on board to take the plan of the stern frame, and rudder, which he much approved of, from the simplicity of its construction.

On the 15th of February, at 7 A. M. weighed anchor, and made sail, attended by Mr. Lockwood, for the purpose of witnessing the effect of the machine. Made all sail upon a wind, and steering as well as with the regular rudder; standing off and on in sight of His Majesty's ships, lying in Carlisle Bay, and tacking with great facility until 6 P. M., when we bore away, and made all sail possible. From this time, until we made the East end of Jamaica, at noon on the 22nd, the machine acted with equal effect on the ship as with the proper rudder, and carrying the same sail, having frequently very strong breezes, and a heavy swell, the ship for many hours together going nine and ten knots; making the passage, from Barbadoes to Jamaica, in a little less than seven days.

On the 23d February we anchored in Port Royal Harbour, and found lying there H. M. S. Polyphemus, Vice Admiral Rowley.

Thus ended a voyage in the ship Cornwall, having only sailed four days from England when she lost her rudder, and afterwards run a distance of at least 1250 leagues; being at sea 41 days, with a machine invented and improved upon progressively, on her voyage, for 18 days, when it was considered complete, and supplied the place

of

of a regular rudder, far beyond our expectations, considering the rude idea which first presented itself.

Reference to the Engraving of Captain PEAT'S *temporary Rudder, which can be quickly fitted out by a Ship's Company, when at Sea; and from such Materials as they always have on board. See Plate* 8, *Fig.* 1, 2, *and* 3.

PLATE 8, fig. 3, shews all the part of this contrivance detached, and ready for launching over the ship's stern; fig. 1, shews an elevation of it in action; and fig. 2, a plan answering thereto. The invention consists of a top-mast, placed out of the ship's stern, having planks fixed at the end of it, which go edgeways through the water; the mast is attached to the stern by a kind of joint or socket, on which, by proper guys, it can be inclined in an angle, with the keel either larboard or starboard; and will steer the ship as effectually as a proper rudder.

To fit out a ship on this plan, the following materials must be collected and prepared as soon as the rudder is gone, or expected to be lost.

1st. A spare top-mast A B, fig. 2, and two top blocks *h h*, which must be securely lashed on at each end of it.

2nd. A top-sail-yard C D, which must have cleats, nailed securely upon it, forming a shoulder at the end C, which is to be kept on board; and at the opposite end must be framed a case *e e e*, formed of pieces of oak plank, nailed firm to the yard, on each side, the left or foremast part being chamfered off and leaded: so that by present-

ing

ing a narrow edge it may make the less resistance in passing through the water.

As the taff-rail will not, in general, be found sufficiently strong to resist the force of the machine; a frame *k l m n*, must be composed of substantial pieces of oak, and erected behind it, upon the deck; it consists of two uprights *m m*, set up from a sill *n*, which is spiked down upon the deck: and they support a rail *p*, which is firmly lashed to the taff-rail: and the whole is strengthened by three shores *k k*, stopped from the deck to the uprights *m m*; between these is supported a piece of oak *l*, $4\frac{1}{2}$ inches thick, with a hole through it, of a proper size to receive the end *f*, of the yard; the hole is leathered inside, in which the end *f* of the yard acts with perfect ease, and can swivel about in all directions; the tapered end *f* of the yard is leathered also, that the whole may act easily.

While these parts are preparing by one part of the crew, some should get the top-mast A athwart-ship, over her quarter, and make it fast by proper lashings; the others should be ready with the several tackles which rig it out, to give motion to the rudder when in the water. They are as follows: Two principal guys, *a a*, made of rope, which is $5\frac{1}{2}$ inches girt, and should be of very good materials; they are to be made fast to the boards at *e e*, and carried through the top blocks at *h h*; the end has the block *r*, of a liff tackle purchase, turned in; the other block being lashed to one of the stanchions on the ship's quarter, and the fall carried through the leading blocks *s s* to the steering wheel F, situated upon the ship's deck.

A topping lift, *b b*, suspends the weight of the rudder from the spanker-boom G: it is a gun tackle purchase, and is of great use in getting the machine out of the water,

and

and also to assist in getting it in; the fall of the purchase is carried along the boom to a cleat spiked to it.

c is another topping-lift from the rudder to the mizen-mast head; it likewise assists to get in the machine, as well as for a substitute, should either of the guys break; it should be 3½ inch rope.

Two short luff tackles *d d*, fixed to the taffrail and cross piece *p*: they are for the purpose of holding the end of the mast firm in the socket, and materially aid in placing and displacing it.

A jack-stay, *i*. This is a rope stretched tight from the planks at *e e*, to the other end of the mast; on this a weight, *t*, is suspended. The machine is ballasted sufficiently for common occasions when the ship is going less than 8 knots; but this additional weight, consisting of shot sewed up in canvas, is to assist in keeping the whole of the machine in the water, when going more than 8 knots; and when going less, to be hauled up by the line *v*.

The mode of operation in this machine will appear evident from the above description; the steering wheel F, being turned either way, acts to bring in the fall of one of the guys *a*, and give out the other, producing an inclination of the rudder, as in fig. 2, so as to put the ship about as expeditiously as a common rudder; and upon the same principle, viz. that of making a resistance to the ship's motion, on either side of her keel, at pleasure. The ship Cornwall, in which the contrivance was first tried, had her wheel fitted close to the rudder-head, and she steered with a short tiller abaft the rudder. In ships fitted in the common manner, the tackles would lead to their wheels in a similar way; the only alteration from the figure being,

that the wheel is placed much farther forward on the deck, and the leading blocks *s s*, are of course placed opposite to it.

Certificate and further Observations from Mr. A. Lockwood, Master-Attendant of H. M. Naval Arsenal, Barbadoes.

The Cornwall lost her rudder on the morning of the 4th of January, and got this machine over on the 7th at noon; arrived at Barbadoes on the 11th of February, and at Port Royal on the 23d. During the passage from Barbadoes to Jamaica, this machine acted with great effect, the ship carrying royals and all studding sails night and day, and for several hours together going 10 and 10½ knots; during which time she required less wheel than with the common rudder, and at no time did the temporary rudder require to make an angle of more than 10 degrees, either in the act of wearing or tacking.

This simple, and truly ingenious method of governing a vessel in distress, I recommend earnestly to the notice of all persons subject to casualties, that may require an expedient of this kind; and although temporary rudders are no new subject, yet the one here delineated is unquestionably the best ever held to public view. Little more need be said in its praise, than the concurrent opinions of seven professional men (whom I know to possess clear judgment) that the rudder was superior to any that could be made at this island, and they had no hesitation in recommending Captain John Peat to proceed on his voyage to Jamaica, without any alteration in it whatever; and I can venture

ture to assert, without hesitation, that the machine in question not only supersedes Pakenham's rudder, which stands in such high repute, but every attempt of that nature hitherto made, and reflects the highest credit on Captain Peat for his progressive improvement upon the rude idea which first presented itself.

The circumstances favourable to the machine are, first, its being composed of such materials as vessels of any description are possessed of; secondly, the simplicity of its composition superseding the absolute necessity of a carpenter; thirdly, that it may be constructed and put in action, even in a gale of wind, in two, or at most three hours. Its properties are, 1st. That it can be shipped at pleasure without delay, and with very little trouble; 2d. That it cannot, by any shock or violence, be rendered unfit or useless; 3d, That the guy tackle fall, being brought to the wheel, requires only the same force to steer as the common rudder; that the ship is under complete command, as will appear by the ship's log-book, in all the following cases:

"Gale of wind, heavy sea, wind quarterly."

"Light winds, heavy swell."

"Fresh wind, spanker, main-sail and all sail, on a wind, off the wind."

"Staying and wearing."

The sole object of this, my humble labour, being to promote, in however small a degree, the good of the nautical world; I cannot in justice drop the subject without suggesting what, in my opinion, would be, with little additional trouble, a very great improvement. The body of dead water occasioned by the flat open part *x*, of the planks at the end of the yard, tends to impede the ship's progress, and to force the case upwards, which consequently strains

the guys when going very quick. The dotted lines at *x*, fig. 3, I propose to be a piece of plank to be continued on the end of the topsail-yard, so formed or filled up as to carry off the body of water complained of.

(Signed)

ANTHONY LOCKWOOD.

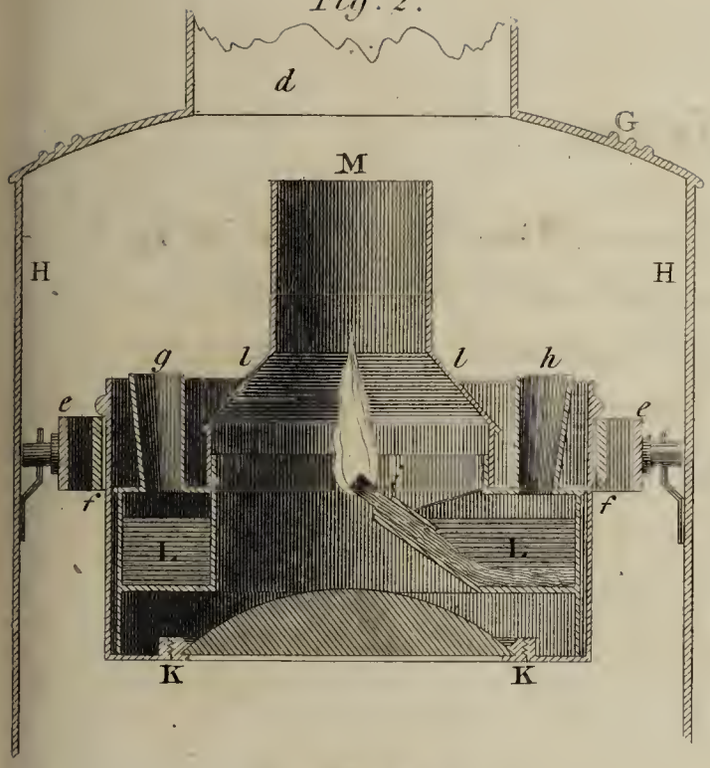
The SILVER MEDAL *was this Session voted to Mr.* GRANT PRESTON, *of Burr-Street, London Dock, for his Ship's Binnacle and Lamp, by means of which the Ship's Compass is seen with clearness and certainty. The following Communication was received from him, an explanatory Engraving is annexed, and a Model is preserved in the Society's Repository.*

SIR,

BEING sensible that you are ever ready to attend to useful improvements, I take the liberty to inform you, that I have brought to the Society, for their inspection, one of my improved Binnacles, in which the light of the lamp is thrown upon the whole face of the compass clear and bright, without being liable to dazzle the eye of the men at the wheel or tiller, or to be seen by an enemy at sea. The lamp is inclosed in a case; it can be lighted below, and brought safely on deck in any weather. The expense of the oil for burning is very small.

I have been making them for some years, and have added various improvements. As I find them to give perfect satisfaction, I have been induced to apply to you, hoping the

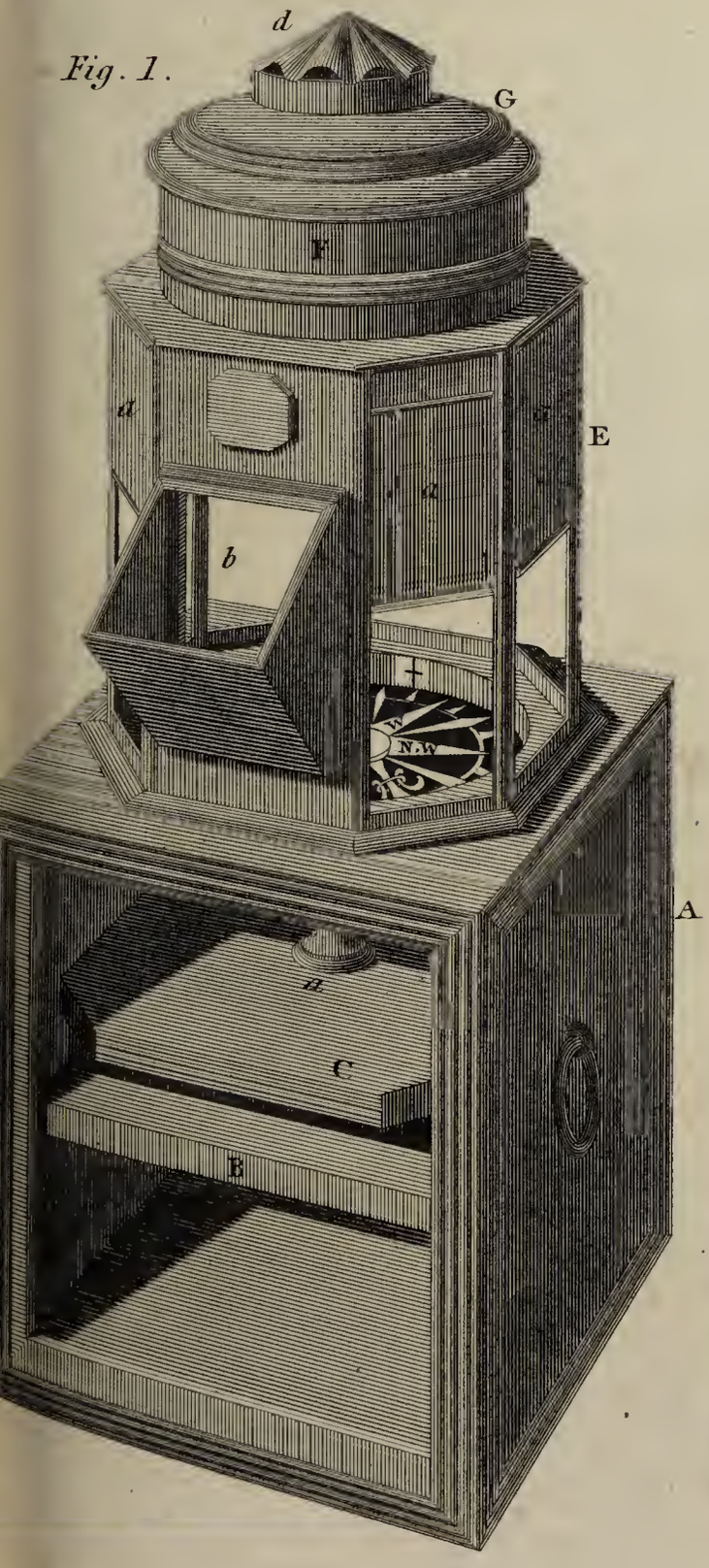
Fig. 2.

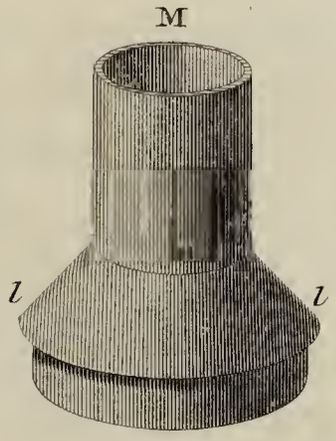


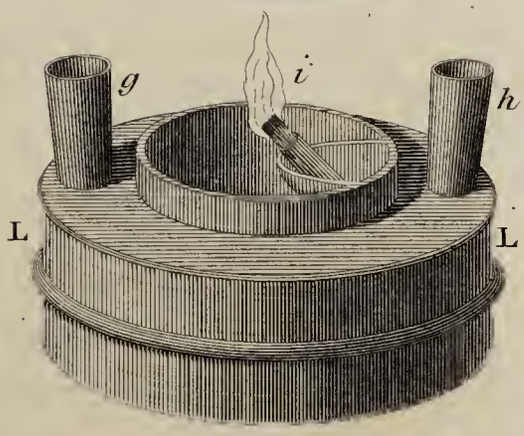
Pl. 9.

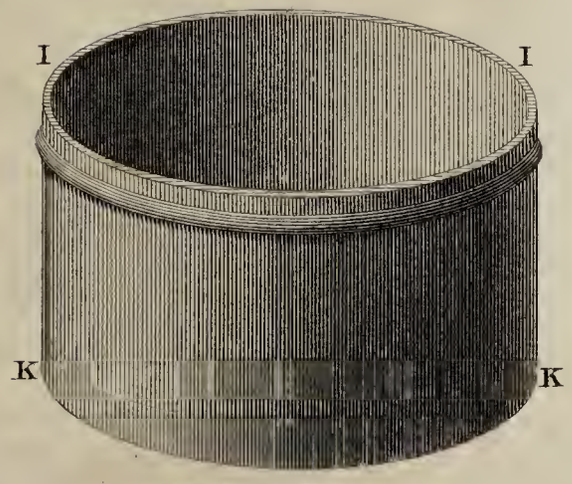
Mr. Grant Preston's Improved Ships Binacle, & Lamp for Illuminating it.

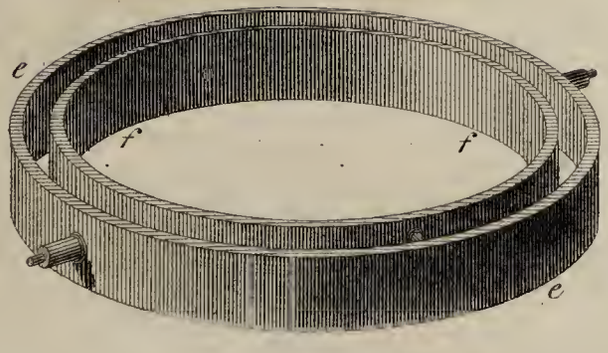
Fig. 1.











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the Society will condescend to consider the merits of an article so important to navigation, and a matter where so many lives and such immense property are concerned.

I am, Sir,
Your very humble and obedient Servant,

GRANT PRESTON.

38, *Burr-street, London Dock,*
Nov. 4th, 1812.

To C. Taylor, M.D. Sec.

Certificates.

DEAR SIR,

I readily comply with your request to bear testimony to the completeness of your improved Binnacles with luminous lamps, a matter of much consequence to shipping. I have the satisfaction to say, that after trials of thirteen or fourteen voyages between London and Leith, on board the Caledonia, I find them superior to any thing of the kind. Wishing you success,

I am, dear Sir,
Your's truly,

ROBERT NOSBOLD.

Caledonia,
Leith and Berwick Wharf, London,
Nov. 14th, 1812

To Mr. Grant Preston.

SIR,

It gives me great pleasure to have it in my power to recommend to the public your valuable Binnacles. I have

had one of them on board the ship Emelina nearly two years, and I can assure you, that I have never met with any thing equal to it. I can strongly justify the recommendation of them to every commander and master's notice.

I am, Sir,

Your obedient humble Servant,

EDWARD SALTER.

29, *Great Prescot-street, Whitechapel.*
Nov. 17, 1812.

To MR. GRANT PRESTON.

SIR,

I HAVE had trial of one of your improved Binnacles with the luminous lamp on board the Eliza for about two years, between London and Leith, and I have to say, that it meets with my approbation, and is worthy to be encouraged.

I am, Sir,

Your obedient Servant,

THOMAS MARSHALL.

Eliza,
Miller's Wharf,
Nov. 17, 1812.

To MR. GRANT PRESTON.

*** Captain MACKAY attended personally at the Society's house, and stated, that he had used these Binnacles on board the ship Lord Forbes, and found them to exceed his expectation; that a good steady light on ship-board is of infinite consequence, and he found this Binnacle to answer every desired purpose, giving a sure steady light, and

and requiring only a small consumption of oil, viz. about three wine-glasses in twelve or thirteen hours. That in this Binnacle he can in the day-time see all the bearings without moving the compass, and that at night the light may be secluded from the sight of every person but the steersman.

Reference to the Engraving of Mr. Grant Preston's improved Ship's Binnacle, and Lamp for illuminating it. Plate 9, fig. 1, 2.

The binnacle or box which contains the compass, in ordinary ships, is a very imperfect and inaccurate contrivance; it is a box situated upon the deck, with a partition, dividing it into two chambers, one for containing a lamp or candle, and the other for the compass-box; the partition having a pane of glass in it to admit the light upon it, and the front of the division, where the compass is kept, has also a window to see into it. The compass-box is generally made of wood, and square, containing within it a circular brass box, suspended on gimbals, and in this is the compass card; its points are read against a mark, usually made by a pencil, withinside the brass box, and called *Lubber's Mark*. A line drawn from this to the center of the compass card, should, in all cases, be exactly parallel to the line of the ship's keel, otherwise her course by the compass will never be correct; the manner in which the compass-box is fitted into the binnacle, renders this very uncertain, for the square box being smaller than the inside of the binnacle, wedges are driven in all round to make it fast; but there is nothing to make it certainly parallel to the ship's keel. The binnacle is frequently made

with three divisions instead of two, then a compass is placed in each side, and the light in the division between them; but, unless the binnacle is very large, there is an objection to placing two needles so near together, as they are liable to act upon each other. The light is very imperfectly thrown upon the compass card in the common way, and may also be seen at a distance from the ship.

The binnacle invented by Mr. Grant Preston has a cylindrical top, which incloses the lamp in a case, being on that account convenient for lighting below in case of bad weather, which convenience has been long wanted by mariners; the body and upper part of this case being made of copper, renders them very durable and compact. The lamp gives a powerful light vertically on the compass; is simple in its construction, steady in its burning, and the expense of the oil small; no light is seen to dazzle the eye of the man at the wheel or tiller, nor is any light shewn which can be seen by the enemy at sea.

Fig. 1 of Plate 9, is a representation of this machine in perspective, as it stands upon the deck of a vessel opposite to the steering wheel. Fig. 2 is a section of the box, containing the lamp and reflector; and the remaining figures are views of its different parts, detached.

AA, fig. 1, is a square box, closed by a door in front, which is omitted in the figure, to shew the interior. This box is fixed down, in a proper situation, on the deck, and supported at a height favourable to view the compass-card which it contains; the two sides being exactly parallel to the ship's keel. B is a shelf in the box, to support a board C, which exactly fits the box, but has its angles taken off to permit it to slide in and out more freely; it has a stem, *a*, of brass wire standing up from the center

center of it, and terminating in a sharp point, on which the compass card is freely suspended to turn round; being then included within a circular opening made through the top of the box, and its divisions reading against a line (called by the seamen "*Lubbers Mark*") drawn on a piece of white paper seen plainly in the figure. The opening in the top of the box is surrounded by an octagonal lantern E, which has glass panes in all its sides, half way up from the bottom, to admit light in the day time, but at night these are closed by sliding shutters *a a a*. The compass is seen through the glass *b*, which is placed at a proper inclination to command the view of the card; the lamp is situated in a circular box, fitted into a ring F, at the top of the lantern frame; and has a dome G, with a chimney *d*, to take off the smoke. The section, fig. 2, will explain the interior parts, H H are the sides of the cylindrical box, which fits into the ring F, fig. 1; *e e* and *f f*, are the sections of two brass circles, called the gimbals, see the separate figure below; the external one has two projecting points, which are received in pieces of copper soldered to the inside of the box; the internal ring has similar pivots, but these are received into holes in the outer ring, the direction of the two lines of pivots being at right angles to each other, hence the interior ring, and all which it supports, has an universal motion, and if properly balanced, will preserve its horizontal position in any inclination of the box. I I, K K, is a brass box, also shewn separately beneath, which fits into the ring F, and has in the bottom of it a large plane convex lens K K, which concentrates the light of the lamp above, and throws it down upon the card beneath. The lamp L L, see also the separate figure, is just within the box: it consists of a deep copper hoop, forming the external

ternal surface; a lid at the top, and a bottom half way down, which have each a large hole through their centers, and may therefore be considered as rings; another hoop being soldered within these rings, forms a complete hollow ring, in which the oil is contained, as shewn at LL, fig. 2, being filled at two tubes *g h*. The wick *i* is situated in a kind of spout, which proceeds from the interior of the ring to its center; and, being very narrow, diminishes very little of the light; for, as shewn in the figures, the flame is caused to project over the end of it, and then comes in the center of the whole, that the lens KK may throw the light down with the greatest effect; and to increase this, a reflector is added. This is a kind of conical chimney, M, see also the detached figures, which stand over the lamp, and includes the light; the conical part, L L, of this, is tinned withinside, and well polished, to reflect the light downwards. By this means the card is always well illuminated, and if the shutters *a a* are put down, no light is shewn which could be perceived by an enemy at sea, for the only aperture *b* directs the light upwards, and that in a direction where it will not fall upon any part of the ship.

The lamp is easily trimmed or lighted, by taking out the box H from the ring at the top of the lantern; the lamp of course comes with it, and there is a large hole in one side, to give access to it; if it is to be filled with oil, the box is turned upside downwards, and the gimbals *e f*, as before mentioned, keeping the lamp horizontal, it may be filled or taken out, to clean the conical reflector, and the lens also if they require it.

The

The SILVER MEDAL *and* TWENTY-FIVE GUINEAS *were this Session voted to Mr.* THOMAS ROBERTS, *of Wardour-Street, Soho, for Elevators or Machines by which Persons can be raised up to a great Height, and which Machines may be employed as Fire Escapes, Observatories, or for Repairs of Buildings. The following Communication was received from him. Two explanatory Engravings are annexed, and a Model and a Drawing of the Machine are preserved in the Society's Repository.*

SIR,

HEREWITH I send a Model of an invention for the consideration of the Society of Arts.

I constructed this Model with the view of its being rendered serviceable in the event of a siege. I thought it might also be applied for the purpose of an escalade, as it might be used and removed with ease from place to place, as might be required.

It may also be used as an observatory, or to assist persons in cases of fire, or on many other occasions.

Attached to the landing there is a bridge, which will easily be placed in a direction so as to communicate with a wall or window.

The Drawing sent with the Model is intended to shew a more simple and cheaper method of effecting the same purposes, and may be raised with equal facility by one screw instead of four which are employed in the Model.

Any

Any further explanation which may be desired I shall be ready to furnish, and am,

Sir,

With the greatest respect,

Your most obedient humble Servant,

THOMAS ROBERTS.

25, *Wardour-street, Soho,*
April 5, 1813.

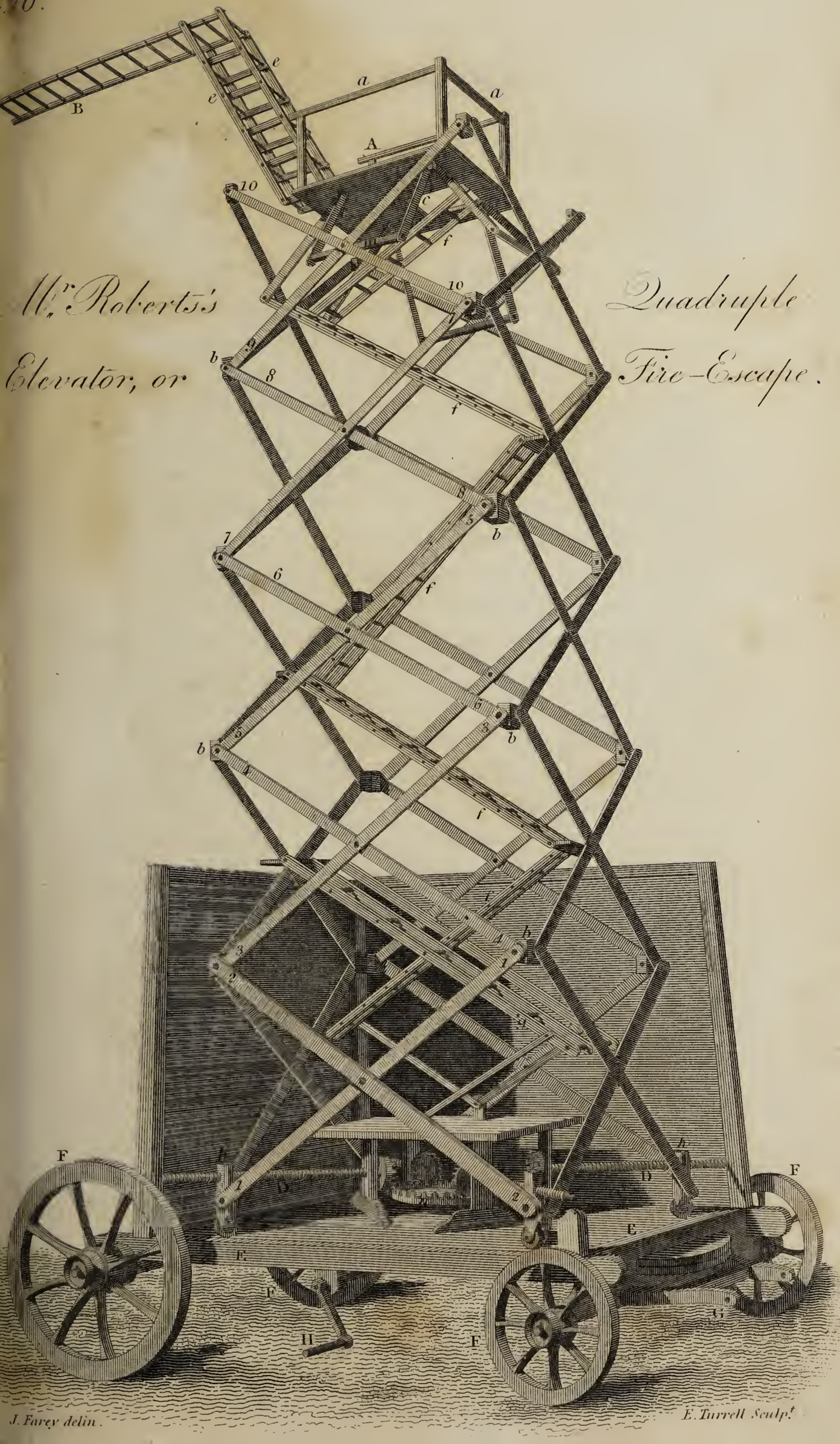
*** The whole machine, when raised to its greatest height, will be above four times the height of the box in which it is contained when lowered, and in which it can be inclosed and conveyed by means of the four wheels underneath from place to place, as occasion may require.

Reference to the Engraving of Mr. Thomas Roberts's Quadruple Elevator, or Fire Escape. Plate 10.

THIS machine consists of a very ingenious combination of levers, or bars, which, when out of use, shut down close into a chest or case, mounted upon four wheels, for convenience of moving it from place to place, in the same manner as a fire engine. By turning a handle or winch, the levers are caused to rise out of the box, forming a lofty pyramid, as shewn in the figure, which, having ladders within it, makes a convenient scaffold and staircase, by which any person can ascend to a platform situated on the top, to assist others in escaping from a house when on fire, or for many other purposes, to which this machine may usefully be applied.

The levers are forty in number, and are arranged in four sets, forming the four sides of the frame or pyramid; as the levers

Mr. Roberts's Quadruple Elevator, or Fire-Escape.



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levers of all these four sides are connected together in the same manner, the letters of reference are only marked upon one side, which is the front, to avoid the confusion of such a number of letters. The ten levers belonging to this front side are marked 1, 2, 3, 4, 5, 6, 7, 8, 9, and 10: they are jointed together in pairs, by center pins passing through the middle of each; thus the pairs 1 and 2, 3 and 4, 5 and 6, 7 and 8, 9 and 10, are united together by their respective centers, so as to open and shut, in the manner of a pair of shears; these pairs are again united together at their ends, 2 and 3, 4 and 5, 6 and 7, 8 and 9, 1 and 4, 6 and 8, 5 and 8, 7 and 10. The consequence of this arrangement is, that by bringing the lower ends 1 and 2, of the first pair of levers together, the upper ends 1, 2, are also made to approach each other, and carrying with them the lower ends of the second pair 3, 4, causes them to shut towards each other. These operate upon the next pair, and so on up to the top. Thus the ends of the whole system of levers are caused to approach each other at the same time, which, by bringing all of them nearer to the vertical position, increases the height of the pyramid to almost any required extent, until they are exactly vertical. It is upon this principle that the frame is made to rise up to elevate the scaffold A, which it bears upon its top to a sufficient height to reach the upper window of a house, &c. The center pins which unite the extremities of the levers together, are screwed into blocks of wood *b b;* and the center pins of the levers, forming the other side of the frame, being fixed into the same blocks, the different sides of the pyramid are united together, as the figure shews too plain to require any other reference. The scaffold or platform A, at the top of the machine, is supported from the center pins connecting the upper pair of levers 9 and 10. These pins have,

have, within-side the frame, horizontal rails *m* attached to them; at the extremity of these are jointed rods *c c*, which at the upper ends, are connected by the joints to the four angles of the platform A, so as to carry it up horizontally, when the frame is elevated. A hand-rail *a a*, surrounds the edge of the platform, at a proper height, to prevent persons falling over. An apparatus is also erected upon this platform, to form an horizontal communication with the window of a house, &c., when the machine is placed at some distance from it: it consists of two ladders *e e*, placed at a small distance asunder, and parallel to each other, being united by a number of bars extending from one to the other, and connected to them by joints. Both ladders move at their lower ends, upon a center pin, which is fixed to the platform, so that they can incline either way at pleasure; to the top of these two a third ladder B, is jointed, in the same manner as the horizontal rails which connect the two together. This communicates with the window of the house, and may be made to reach out to any moderate distance, by inclining the two ladders *e e* on their centers; and in all positions it will retain its horizontal position, so that a person can safely walk along upon it from the window of the house, and descend by the ladder *e e* to the platform; and thence, by means of the ladder *f f*, situated in the inside of the machine, to the ground. These ladders are extended from pieces of wood fixed to the joints or center pins of the respective levers, so that in all positions of the frame they form a continued staircase or ascent from one ladder to the next; the inclination of the ladder altering in the same degree as the levers of the frame, to which they always remain parallel. The whole machine is, as before-mentioned, mounted on the four wheels F F F F, and is drawn by shafts, connected

to the pieces G, which project from the axletree of the fore-wheels, in the same manner as a fire engine or other four-wheeled carriage.

The lower ends 1 and 2, of the first four pair of levers, are caused to approach each other for the purpose of elevating the pyramid, by means of four large screws D D at the bottom of the machine. They have pivots at the ends, which are received into pieces of wood fixed to the floor of the carriage E E, on which the machine is erected, so as to turn round freely; and they operate upon female screws within the pieces of wood *h*, to which the lower ends 1, 2, of the levers are jointed; these pieces of wood have also rollers running upon the floor of the carriage, to diminish the friction of advancing the ends of the levers together, when the machine is to be elevated, which would otherwise be very great, as these rollers support the whole weight of the superstructure. The four screws D, radiate at right angles from the center of the machine, and have toothed-wheels fixed upon the inner end of them, which are actuated by a horizontal crown wheel *m*, common to them all, and situated in the center of the machine, within a square frame formed by the four pieces of wood, which bear the pivots of the screws D D. Now it is evident, that by turning this central wheel, the four screws will all be put in motion uniformly together, and operating upon the pieces of wood *h h*, will cause them all to approach or recede from the center together; and, carrying the ends 1, 2 of the levers with them, the frame is made to rise up out of, or descend into, the chest at pleasure.

The central wheel *n* is fixed upon an upright spindle, which has another crown wheel fixed upon it beneath the floor of the carriage; and this is turned by a small pinion fixed

fixed upon an axis, proceeding to the side of the carriage, where the winch H is applied to the end of it; this being turned round by a man, turns the wheel *n* with a considerable power, and elevates the frame. The ladder marked g, within side the machine, at the lower part, shews how a second set of ladders may be applied, so as to make two complete staircases from the bottom of the machine to the top, but only one set of the ladders is shewn, to prevent confusion. The lower end of this ladder, as well as that marked *f*, is supported by a rod, jointed to it, and extending to a joint on the top of the square frame in the center of the machine.

The Model deposited in the Society's collection contains also a very ingenious contrivance for preserving all the steps of the ladders horizontal, let their elevation be what it may. This cannot be shewn in the Plate, but may readily be comprehended without a separate figure. The steps of the ladders are fitted to the sides or cheeks by two center pins instead of fixed tenons, and have each a tail projecting in the middle of their back or under sides. These tails are all connected together by a rail or bar, which has slits or mortices through it to receive those tails, and holes are made both through the sides of the mortises, and through the tails which receive pins, upon which the tail turn. By this means all the steps of the ladder are preserved in a parallel position to each other, however they may incline on their respective center pins, on the same principle as the bars of a parallel ruler or Venetian window-blind, which likewise act in a similar manner to the steps of these ladders. The long platform, forming the upper and lower steps of each ladder, which are also the landing-places from one ladder to the next, are attached to the center pins which unite the

pairs

pairs of levers of the frame; and thus they are always kept in a horizontal position, and by means of the bar or rail behind the ladder, all the other steps are kept horizontal likewise. The ascent is thus rendered extremely easy and safe.

Reference to the Engraving of Mr. Tho. Roberts's *Elevator, or Fire Escape. Plate* 11.

Plate 11 contains a representation of another form of machine likewise invented by Mr. Roberts for the same purpose as the preceding; but, being of a less expensive construction, it may perhaps prove of more general utility.

It is upon the same principle as the other, but has only three sets of levers or bars, situated parallel to each other, instead of four, arranged on the different sides of a pyramid: by this means a single screw is sufficient to elevate the whole. A A represents the frame of the carriage, mounted upon the four wheels BBBB. At one end of the carriage are fixed blocks, CCC, for the joints of the lower ends of the levers AAA to be attached to; these are jointed to others, DDD, which rest, by means of rollers, on the frame; and the middle one has a block of wood with a female screw, through which passes the screw E, on turning which, the ends of the levers DDD can be brought towards the ends CCC, to elevate the machine; the other pairs of levers, which are erected upon the lower pair, will be readily understood, from what has been said of the first machine: observing first, that the three parallel sets CCC, &c. of levers, are held together by the center pins which

unite their joints, being common to all three, as is shewn at *a a a*.

The platform K, at the top of the machine, is supported from the upper pair of levers, GGHH, by rods I I, jointed to the ends of them, and also to the angles of the platform, by which means it is carried up parallel to itself.

The ladders are formed within the frames, by rails or bars extending across them. There are two complete and distinct sets of ladders in this machine, one marked LLLL, and the other *l l l l*, each extending from the top to the bottom of the machine; so that one person may ascend, and another descend, at the same time, without meeting each other. The communication from the top of one ladder to the foot of the next is formed by small landing-places M M M at the end of each, which have a hand-rail *m* round them, supported by uprights *n n*, firmly erected upon the landing. These landing-places are preserved in a horizontal position, in all situations of the frame, by rods *p p*, extended from the hand-rail of one platform to the next, in a direction parallel to the great levers of the machine, which direction they will always maintain, because they form so many parallelograms, the sides of which will always remain parallel, as will also the ends. These are represented by the uprights *n n*, therefore these uprights, and consequently the landings to which they are firmly attached, will remain parallel throughout the whole machine.

The two uppermost of the landing places M M, being retained in a horizontal position, by being attached at right angles to the upright standards of the platform K, preserve all the rest in a similar situation; and which is still farther maintained by causing the extremities of the lower

Mr. Roberts's Elevator, or Fire Escape.

lower platforms O O O to rest upon the basis or frame of the machine likewise.

In this machine, the steps of the ladder may easily be kept horizontal and parallel to each other, by the same means as described for the former machine, viz. by a rail carried behind the steps to connect them all together, they moving on center pins like Venetian blinds; the rails are also jointed to the landing places at the top and bottom of each ladder, which being kept horizontal by the means before-mentioned, all the steps keep so likewise.

The SILVER MEDAL *of the Society was this Session voted to Mr.* G. HUGHES, *of Manchester, for the Invention of a temporary Scaffold moving round an upright Pole, by the use of which the Interior of Domes may be easily repaired and beautified. The following Communication was received upon the subject, an explanatory Engraving is given in this Volume, Plate 2, and the original Drawing preserved in the Society's Repository.*

SIR,

I TAKE the liberty to inclose to you a sketch of a Scaffold which has been used for repairing and beautifying our Exchange. It is the invention of Mr. Hughes, a respectable painter and plaisterer of this town If its utility and simplicity should strike you as forcibly as it has done me, the patronage of the Society would very highly

oblige him, and render it useful to the community by giving it publicity in such way as the Society may think proper. Its utility is confined in a great measure to the repairing or finishing of circular buildings. The actual expense of its erection did not exceed four pounds, and the estimate of a scaffold in the common way would have been forty to fifty pounds. I flatter myself you will excuse this freedom, more particularly from its originating in a town with which you have had so long and intimate connection.

I am, very respectfully,

Sir,

Your obedient Servant,

JOHN BRANCH.

Manchester, Oct. 26th, 1812.

To C. TAYLOR, M.D. SEC.

Reference to the Engraving of Mr. HUGHES's *Temporary Scaffold for repairing Domes. Plate* 2. *Fig.* 1.

THIS scaffold is contrived to move round on an upright pole, in the center of the dome, and on two wheels running on the floor, so that it can be turned to all parts of the interior of the dome. Fig. 1, of Plate 2, represents an oblique elevation of the scaffold, as erected in the dome R R of the building S. The chief support is a straight scaffold pole A A, which turns on a pivot at top, supported by a piece of wood fixed across the top of the dome in the center; and is supported at bottom on another pivot, resting in a step of wood fixed on the floor. To this pole a light

a light braced frame is fixed, and traverses round on two rollers BB; these are situated at the bottom of the two upright legs K K, which are nearly as high as the walls of the building. The tops of these support the ends of two curved planks C C, the upper ends of which are bolted on each side of the center pole at D. Between these planks a number of boards or planks are placed horizontally, so as to form a scaffold, on which the workmen stand to work at the interior of the dome, at any height they find convenient. The width of these steps gradually diminish from the space between the two uprights B B, to a very small width at the pole near D. The whole is braced by the two diagonal stays I I, extending from the bottom of the uprights B B, and secured to the upper part of the pole at E. The curved planks C C, are also strengthened and supported by the short braces F F, G G, and H H, which extend from the stays I I to the curves C C; these form a strong and secure scaffold, which may be easily moved round to any part of the internal dome at pleasure. To strengthen the frame sideways, diagonal braces are applied between the two uprights K K.

TWENTY-FIVE GUINEAS *were this Session voted to Mr.* GEORGE PRIOR, *Jun. of Otley, in Yorkshire, for his Method of preventing the ill Effects arising to the Workmen from inhaling the small Particles of Iron and Stone in grinding or pointing Needles. The following Communications were received from him, an explanatory Engraving is annexed, and a Model of the Apparatus preserved in the Society's Repository.*

SIR,

HAVING invented and made a Model of an apparatus for removing the particles of dust and steel necessarily arising in the pointing of needles on the dry grindstone, which appears to me to be very simple and effective, I am induced to send it to you, requesting you will have the goodness to lay it before the Society for their judgment.

I am, Sir,

Your most obedient humble Servant,

GEORGE PRIOR, Jun.

Otley, Yorkshire, March 1st, 1813.

To C. TAYLOR, M. D. SEC.

Observations made by Mr. G. PRIOR.

THIS method of taking away the particles of dust and steel which float in the air by pointing needles on the dry grindstone, and which are so prejudicial to the health of the workmen, is effected by causing a current of air to pass the top, sides, and bottom of the grindstone, by a tube

tube inclosing them, which tube is slit lengthways on the sides, top, and bottom, opposite the workman; one end of the tube having a communication with a pair of bellows worked by a crank at the end of the axis of the wheel which turns the grindstone, and the air escaping through the slits or openings in the tube, as it passes the grindstone, forces along with it the dust (which would otherwise float in the room, and be inhaled by the operator) into the receiver which incloses the other side of the grindstone, from which a funnel or hollow tube must be extended into a chimney, or through the external wall, so as to convey them from the apartment where the operator is at work.

It is not necessary to remove the large particles of sand, &c. which are heavy enough to fall to the ground, but only those which are so light as to float in the air, and which, in the act of breathing, are in the common mode drawn into the lungs, producing many disorders, and in very few years prove fatal to the operators.

In grinding the needles, the points must be laid on the grindstone, as nearly under that part of the tube which goes over the top of the stone as convenient, for which purpose the tube is made to move backwards or forwards, so as to suit the most convenient part of the grindstone employed by the workman.

There is a great advantage arising from blowing the air out of the room, as any stagnation of air is thus prevented, and the whole quantity being blown out in a very few minutes, there will always be a renewal of fresh air, which will be very salutary to the workmen, particularly if confined in a small apartment.

One pair of large bellows would be sufficient for many

grindstones, if it should be thought more convenient, and every mechanic would know how to apply them.

In the Model, that part of the grindstone is designedly left uncovered, where the rest for the workman's hands ought to be, to shew that the dust, which would be whirled round by the motion of the grindstone, is taken off by the current of air meeting it underneath, and forcing it along the funnel.

GEORGE PRIOR, JUN.

Reference to the Engraving of Mr. GEORGE PRIOR, *Jun. Machine to obviate the ill Effects of grinding the Points of Needles. Plate* 12, *Fig.* 1, 2.

THIS contrivance consists of a conical box or case, inclosing nearly one half of the grindstone, to receive the dust of steel and stone, made in the operation of grinding, which is caused to enter the box by a current of air produced by a pair of bellows. The Model deposited at the Society's house not containing an exact representation of the machine commonly used for grinding needles, it will be necessary to give some explanation, to shew how the machine may be applied to the common mills. The needle grinding mills are generally very extensive buildings, with numerous apartments, each containing many grindstones for pointing needles, all which are driven by one powerful water-wheel, or other first mover. And the bellows, which are employed in Mr. Prior's plan to carry off the dust, might be made large enough to supply all the grindstones contained in one room, or even one wing of the

the mill. A A represents a large wheel, giving motion to the grindstone by a band *a* passing round a pulley B, fixed on the axis or spindle of the grindstone C, (which is supported in the usual manner, though not here shewn.) The great wheel is represented in the drawing as if mounted in a frame D D, to be turned by a handle, on the opposite end of the spindle, in the same manner as the wheels used for turning laths or cutler's grindstones; but, in the needle mills, this large wheel is part of the mill, and is generally situated beneath the floor of the room, in which the grindstones are placed, being fixed on a long horizontal shaft, which carries several such wheels, each giving motion to one grindstone. Upon the end, or any other convenient part of this shaft, a crank E is fixed, which, by means of a rod F, gives motion to a pair of double bellows G, constructed and acting in the same manner as those used for organs, being contrived to keep up a constant and regular supply of air. They consist of two distinct parts G and H, the lower one is the feeder, and throws the air into the upper one H, which is the regulator, to equalize the current of air, and make it constant. The feeder G, consists of two boards, the upper *ff*, fixed, and the lower one *ee*, moveable on hinges at its joint, by means of the rod F, as before described. It is connected with the upper board by leather, surrounding all its sides, and neatly folded. In the lower board *e e* is an aperture, covered by a valve, (called by the organ-builders a pallet), opening inwards to permit the entrance of the air, but to prevent its return: through the upper board *ff* is another opening, with a valve shutting downwards; through this the air passes into the regulator H, which is also made with two boards connected by hinges and leather, in the same manner as the feeder; from the regulator the air passes

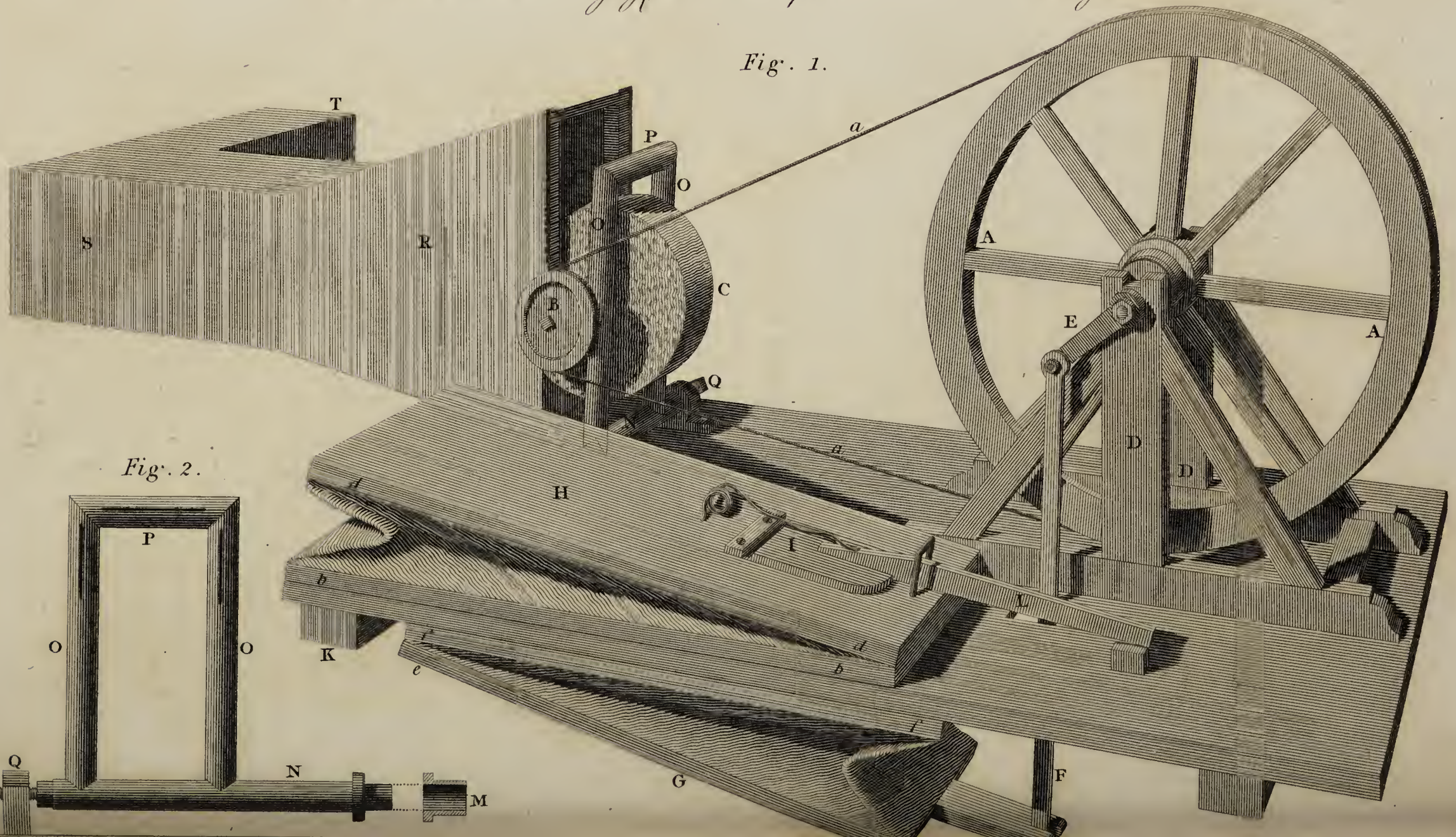
off

off to the grindstones by a trunk K, extending along the whole length of the mill immediately beneath the floor. When the lower board *e e* of the feeder is depressed by the motion of the crank E and the rod F, the chamber of the feeder is enlarged, and the external air opening the valve in the board *e e*, fills the cavity. When the board is lifted up, this valve closes, and the contained air is forced through the valve in the board *f* into the regulator, the repetition of which motion keeps a constant supply of air in the regulator. The top board *d d* of this is loaded with weights, which, resting upon the included air, forces it out from the regulator, in an equable stream, through the trunk K, and from that to every grindstone in the mill. N O O P is an assemblage of tin pipes, which surround the grindstone, and have openings in the fronts of them, through which the air issues, to carry off the dust. This is *shewn* separately at fig. 2, where M represents a brass socket, which is supposed to be fixed to the floor, and by means of a small pipe communicates with the wind trunk K; into this the end of the pipe N is fitted, and the other end of it being supported by the point of a screw Q, it turns on this as a center; the two pipes O O are soldered into this at right angles, and are united at the top by the short pipe P: in these pipes small slits or crevices are made, as shewn by the dark lines, through which the air issues, and blowing towards the grindstone, carries off the particles of dust into the trunk R, fig. 1, which may be continued forwards at S, through the wall of the building, into the open air; or, if it is turned sideways, as at T, all the trunks R of the other grindstones may be carried into it, which will succeed better, because the whole body of air being thus carried through one common trunk, and being thrown out into the open air in

one

Mr. Prior's machine to carry off the dust produced in Pointing Needles.

Fig. 1.



one place, will have the greater force to carry the dust with it. I is a safety valve, covering an opening in the top of the upper board *d d* of the regulator: it is kept shut by a wire spring, and has a wooden handle or tail L, by which it may be lifted up. When the board of the regulator rises as high as is intended, this tail comes in contact with a piece of wood, and thus opens the valve, permitting the air to escape; by which means there is no danger of the bellows being burst, for this valve is always opened when the regulator becomes full, so as to be in any danger of a rupture. The pipes O O P, as beforementioned, turning on a center, can be moved nearer to the grindstone at pleasure, as it becomes reduced in diameter by wearing away.

The SILVER MEDAL *was this Session voted to Mr.* N. DOUGLAS, *of Chiswell-street, for an Instrument for firing Cannon, by which a number of Cannon may be fired in quick succession without the necessity of a Match. The following Communication was received from him, an explanatory Engraving is annexed, and one of the Instruments is preserved in the Society's Repository.*

SIR,

I HAVE sent, for the consideration of the Society, an instrument of my invention for firing cannon. In adopting

ing it, for the use of merchant vessels, it would obviate the great inconvenience of the slow match, and the trouble and delay which I have frequently witnessed in making a poker red hot in order to fire a gun. The gun-locks, which are partially used on board men of war, would be attended with great inconvenience to be used in trading vessels. One of the many advantages which my instrument possesses, is the quickness with which a gun may be fired with it, when the object is found in a right line with it, and the ship in motion. The price of one of these instruments will be about 8*s.*; it is simple in construction, and certain in effect; and it is probable its use on board merchant ships would prevent many from being taken by an enemy, as one or more instruments would scarcely take up any room, and be ready always for immediate use; and one instrument could be employed, in quick succession, to fire many cannon.

I am, Sir,

Your obedient servant,

N. DOUGLAS.

21, *Stangate-street, Dec.* 16*th*, 1812.

To C. Taylor, M. D. Sec.

Reference to the Engraving of Mr. Douglas's *Instrument for firing Cannon. Plate* 13, *fig.* 1, 2.

This is proposed to be employed as a substitute for the match, in firing cannon, being more expeditious, and less dangerous. The large ships in the royal navy have, for some years past, been provided with locks to their

their cannons, and have found great benefit from the change, in avoiding the dangers of so many matches which, in an engagement, were blazing in every part of the ship, and very likely, if thrown down by carelessness, to set on fire or blow her up. Merchant's ships have not been able to adopt this plan, on account of the expense, and the danger of locks being out of repair, when they are exposed, as their guns must be, on the open deck. Mr. Douglas's invention will be found of great use in these cases: it will apply to any gun, as readily as a match, but will require no preparation for use, being kept below, and ready for service at all times. It is a spring lock, on a new construction, which is fixed at the end of a handle, and being held above the priming of the gun, throws sparks upon it when discharged by its trigger.

Fig. 1, of Plate 13, is a view of its whole length; and fig. 2, a section, on a larger scale, shewing the interior parts detached. The same letters apply to both. A A is a wooden handle, made hollow, to contain the other parts: but to give access to them for repairs; it is made in two halves, which are united together by twine bound round them near their two ends; the parts within the handle are shewn at fig. 2. Here B B is a brass tube, into which a square iron rod C D is fitted, and slides freely; from this a long cylindrical wire *a* proceeds, and passes through a hole, in the extremity of the tube, which also contains a helical spring, formed of strong steel wire, wrapped round, and constantly tending to throw the rod forwards out of the tube. At the extremity D of the rod is a kind of vice, which, by means of two screws holds a flint *b*; this when thrown out by the action of the spring,

spring, strikes against a piece of steel, E F, which may be called the hammer, as it performs the same office as the hammer of the common lock; it has a stem, or tail, screwed fast to the outside of the brass tube, by two screws, at F, and is thus always held opposite to the flint *b*. The trigger is situated at the other end of the handle: it is a catch, G *e*, moving on the center, and pressed by a spring, situated under the end *e*, so that the hook G, at the other end of it, is always in contact with the wire *a*; and when this is sufficiently drawn back the hook falls into a notch in the wire, and retains it until the instrument is to be discharged, by pressing the thumb upon the button *e*, at the end of the trigger; the spring then throws the rod forward very rapidly, and the flint at its end strikes the hammer, and produces sparks sufficient to ignite the priming powder upon the touch-hole of the gun; the instrument being held immediately above it for that purpose.

It may be charged again in an instant after using; to do this the finger and thumb are applied to the projecting extremies of a short wire H, fixed across the other perpendicularly, and coming through the opening H, fig. 1, and another on the opposite side; by this the rod and flint is sufficiently drawn back for the hook of the trigger to catch and retain it, with the spring in its charged state, ready for use. The inside end of the piece of steel E, or hammer, on which the flint strikes, is made inclined to the length of the handle, and curved, as the figure shews, so that the flint will strike obliquely upon it; to increase the effect the stem F is made yielding, like a strong spring, so that the hammer E falls back, in some degree, when struck by the flint, to act like the hammer

of

of a common lock: by which means it produces a greater fire than if it struck upon a fixed hammer, it thus scraping off the ignited particles of steel produced by the stroke.

The SILVER MEDAL, *and* TWENTY GUINEAS, *were this Session voted to Mr.* MALCOLM M'GREGOR, *Bell Yard, Temple Bar, for an improved German Flute, capable of being tuned to a greater extent and certainty than any other. The following Communications were received from him, an explanatory Engraving is annexed, and one of the Instruments preserved in the Society's Repository.*

SIR,

HAVING for a number of years made a series of experiments on musical instruments, I flatter myself that my labour and expenses have not altogether been misapplied; having the satisfaction of knowing that several alterations which I have made in instruments, have been adopted. I am therefore induced to send, for your inspection, a German Flute, in my opinion of an advantageous and convenient construction, as it will admit being tuned in a more extensive and perfect manner, than any hitherto brought before the public. If you should require any explanation respecting its further superiority over those

in

in common use, I will attend for that purpose any time you may appoint, and am,

Sir,

Your obedient humble servant,

MALCOLM M'GREGOR.

No. 29, Bell Yard, Temple Bar,
April 13th, 1813.

To C. Taylor, M.D. Sec.

Certificates.

Sir,

I have tried your excellent improvement on the German flute; it is decidedly, in my opinion, by far the greatest improvement in its various practical uses, that has hitherto been made on that instrument; more especially in that most desirable and most difficult of all the circumstances attending its practice, of being made perfectly in tune with other instruments, in a greater variety and extent of pitch than has ever been hitherto attained; and I most sincerely wish you the greatest success it merits.

I am, Sir,

Your obedient servant,

John Gunn.

No. 63, Great Portland-street,
April 13th, 1813.

To Mr. Malcolm M'Gregor,
29, Bell Yard, Temple Bar.

SIR,

SIR,

HAVING tried your improvement on the German flute, I consider it of the greatest utility, in respect to its being tuned to a greater extent and certainty than any I have ever met with.

I am, Sir,

Your obedient servant,

A. DOMEYER.

TO MR. M'GREGOR,
&c. &c. &c.

SIR,

I HAVE tried your flute, and I consider it a very great improvement, in regard of tuning the instrument to various pitches, without the great inconveniences and expense of having so many middle joints.

I am, Sir,

Your's, &c.

ANDREW ASHE.

April 27th, 1813.

TO MR. M'GREGOR.

*** MR. MINASSI, Mr. WOOD, Mr. PERCIVAL, and Mr. FRASER, attended the examination of Mr. M'Gregor's German flute, and expressed in high terms their approbation thereof.

Reference to the Engraving of Mr. Malcolm M'Gregor's *Improvement on the German Flute. Plate* 13, *fig.* 3, 4, 5.

The objects of Mr. M'Gregor's improvement are, to give the means of tuning the instrument perfectly, when required to alter its pitch, which can be done to the extent of a note above, or half a note below, the *concert pitch*, making an extent of a note and a half in the whole; by which means a piece of music may be performed in a different or easier key from that in which it is composed; the same alteration of the pitch being attempted upon other German flutes, would however put them considerably out of tune, so as not to be endured.

It is accomplished by making the instrument draw out proportionately at all the several joints, which unite its parts; by this means, when the cork or stopple is drawn out to lengthen the tube, and thus to lower the pitch of the instrument, the several joints also admit of the tube being lengthened in its different parts, so that the several spaces between the holes, will bear the same relative proportion to the whole tube, in its lengthened state, as they did before the alteration; by this means the sound, produced by all the different parts of the tube, will accord or be in tune with each other.

Figs. 3, 4, and 5, of Plate 13, are different views of this instrument; fig. 3, being a section through the center, in its whole length; fig. 4, an external view, shewing the keys, &c.; and fig. 5, a section of one of the joints, to shew their internal construction.

The flute is made in four lengths, A, B, C, D, which are united by joints, made to draw out, in order to lengthen

Mr Douglas's Instrument for Firing Cannon.

Fig. 1.

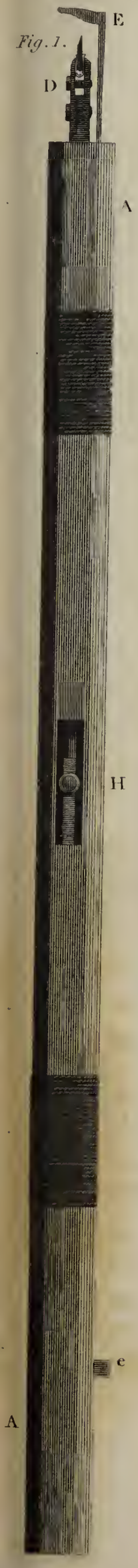


Fig. 2.

Mr Mc Gregor's Improved German Flute.

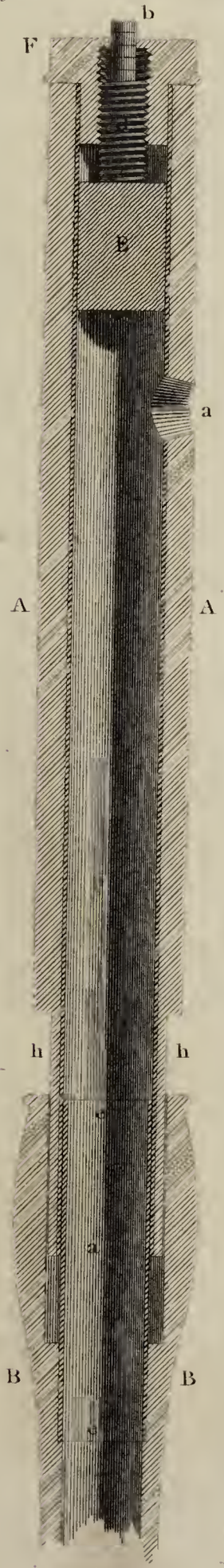


Fig. 5.

Fig. 3.

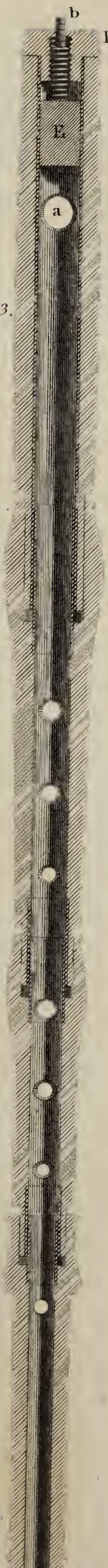
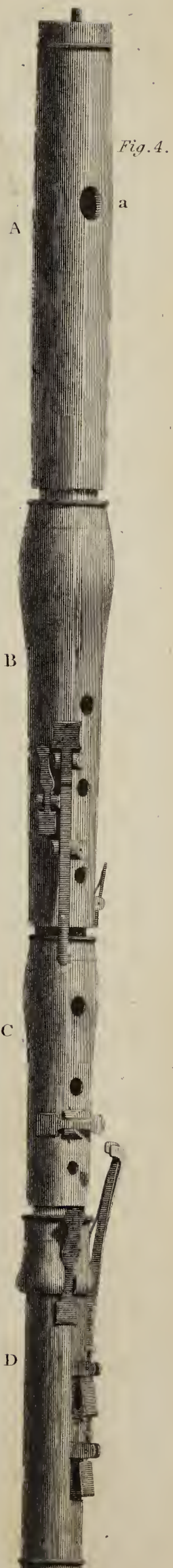


Fig. 4.



lengthen it at pleasure, each joint being fitted with cylindrical metal tubes, sliding like those of telescopes for that purpose; the upper length A has the mouth-hole *a* in it, and the extreme end is shut up by a cork E; as this is required to slide, to alter the length of the tube, it is rendered adjustible by means of a screw *d*, made of ivory, and is part of a piece which goes completely through the cork, and is glued fast to it; the screw *d* is received into an ivory cap F, loosely fitted into the end of the tube, and resting with a flat shoulder upon the end of it; therefore, by turning this nut or cap round, the cork is drawn out, or may be pushed farther into the tube. *b* is a small pin, or tail, projecting from the end of the screw *d*, and coming through a hole in the end of the cap F; it has lines or marks made upon it, which direct how far the cork is to be moved, for the purpose of tuning the instrument to any required pitch. This construction is common to many other German flutes; but in this the three joints, uniting the lengths A, B, C, and D, have also corresponding marks upon them, to shew how much they are to be drawn out, to correspond with the alteration of the cork; and they also completely supply the place of the ordinary *thread joints*, so very inconvenient in use.

Fig. 5, shews one of the joints; here A A is the wood of the upper tube or joint, and B B part of that of the second, which is rather enlarged to admit having a socket bored in it, large enough to receive the tube *h h*, which is formed out of the wood A A, and fits the socket very nearly, but not tight; the principal fitting is made by a thin metal tube, fixed inside the tube B, at *e e*, and is very exactly fitted into the upper tube A, which is lined with a very thin metallic tube, throughout its whole

length, (the other joints having tubes only at their joinings), which prevents it from swelling so much, by the moisture of the breath, as the plain wood would do; and makes also very excellent joints, without the lapping of thread, usually employed in flutes. The interior *e e* tubes, at each joint, have also another effect, that of preserving a perfect bore to the whole tube, as is shewn in fig. 3, which thus diminishes, in a regular manner, from one end to the other, without any other interruption than the different edges of the inner tubes *e e*, which are made very thin, and are scarce discernible. Without these inner metal tubes, sudden enlargements of the tube would take place, at every one of the joints, when they were drawn out, as is shewn in the dark spaces in the section fig. 3: and which cause in the common German flutes, their being out of tune, more or less, when drawn out to alter their pitch.

The holes and keys, shewn in fig. 4, are the same as those used in other flutes, made on the best construction, and are to be used in the same manner; Mr. M'Gregor's improvement relating principally to the tuning at all the joints. The cork E being first adjusted, by screwing the cap F to one of the marks, made upon its pin *b*, the three joints are to be drawn out, to corresponding marks upon the several joint pieces: and when this is done correctly, the holes and keys in the different parts of the tube, will bear their just proportion to each other, and to the whole tube. They will therefore yield sounds which will be a true harmonic relation to each other, and without producing discordant notes, as would be the case if the pitch of the instrument was only altered by the cork at E.

The

The SILVER MEDAL *of the Society was this Session voted to Mr.* ROBERT HUGHES, *of Ruabon, Denbighshire, for an improvement in the Axis of large Water Wheels, to prevent the Pivot or Gudgeon from getting loose, in the Shaft, or to repair it when damaged. The following Communication was received from him, an explanatory Engraving is annexed, and a Model is preserved in the Society's Repository.*

SIR,

I BEG leave to observe to you, that from the common mode in which the gudgeons, for cranes or water-wheels, are now fixed, they are liable to heat in working, and soon become loose; and by attempting to secure them with wedges, the shaft gets split, injured, and rendered useless.

To obviate such inconveniences, and even to repair an injured shaft, I have invented and practised a plan, which has perfectly succeeded, and of which I have sent a model to the Society.

Upon this plan more firmness and security is given, without weakening the shaft by the deep mortices usually cut therein for fixing the gudgeons. My invention is also cheaper than the old method, in which the hoops alone cost about four guineas, and the cast-iron gudgeon £.2 12*s.*; whereas on my plan the expense of the whole will only be £.4 16*s.* If necessary I will

furnish certificates from persons who have made trial of my invention.

I am, Sir,

Your humble servant,

ROBERT HUGHES.

Ruabon, Feb 12, 1812.

To C. Taylor, M.D. Sec.

Certificates.

On the 14th June, 1811, Robert Hughes, of Ruabon, instructed me in making a cast hoop gudgeon, for a tumbling shaft of a large and powerful water-wheel for grinding clay for bricks, tiles, &c. which I have found to be a great improvement, as witness my hand this 3d day of October, 1812.

Thomas Evans.

Trefynant, Ruabon, Denbighshire.

This is to certify, that Robert Hughes, of Ruabon, formed a new construction of gudgeons, for the shaft of a water-wheel he built for me, in the year 1806, which wheel is 28 feet diameter. These gudgeons took in the whole body of the shaft, and wedged the outside. I have not been put to any expense since the making thereof, nor am likely so to be until the shaft decays by time. In short I cannot speak too much in his praise, with regard to his ingenuity and workmanship. Witness my hand, at the Pant Mill, August 20th, 1812.

Thomas Manley.

The wood shaft of a water-wheel, 18 feet diameter, was so worn and decayed at one end, by frequent putting in and wedging of the gudgeon, as to render a repetition of that process impracticable. Robert Hughes, in this difficulty, contrived a cast-iron gudgeon, with a hoop to it, which inclosed the end of the shaft; it was put on and fastened, and has worked steadily ever since. I am informed, that he puts the hoop gudgeon now on new shafts, and it seems to me a great improvement upon the gudgeons formerly in use.

John Jones.

Ruthin, Sept. 14th, 1812.

Reference to the Engraving of Mr. Robert Hughes's *Method of fixing Pivots, or Gudgeons, into the Shaft or wooden Axis of a Water-wheel, which will prevent the danger of their getting loose in the Shaft, and permit their being repaired when damaged. Plate* 14, *fig.* 1, 2, 3.

The ordinary method of fixing gudgeons into wooden shafts, is to have an iron cross, formed on the end of the gudgeon, which is let into the wood, to a considerable depth, and is held fast by small wedges, driven in round it, hoops being fitted round the outside of the shaft, to prevent the wedges splitting it. The defects of this method are, that the shaft is much weakened, by the cutting into it; and the constant strain of a heavy wheel, always acting in different directions, causes the wedges to become loose, and at length fall out; the failure of the

gudgeon is frequently attended with more serious damage, for the wheel falling upon the bottom of the race, generally breaks the rim and buckets by its own weight.

The improvement made by Mr. Hughes, consists in applying a cast-iron box to the end of the shaft, and to this the iron cross of the gudgeon is screwed, so as to fasten it more firmly than by the old method, and without weakening the wood by cutting it away. A A, fig. 1, of Plate 14, represents a portion of the end of the wooden shaft, which is of an octagonal form, and has the water-wheel fixed upon it; it is long enough to reach across the pit, in which the wheel works, and having a gudgeon at each end, is supported and revolves upon them in proper bearings B B is the cast-iron box, fitted fast upon the end of the shaft, and being wedged tight, preserves the wood from splitting as effectually as any hoops can do; upon the end of the box is a projecting flanch, *a a*, and in the face of this four grooves or notches are made, for the reception of the arms of the iron cross *b b*, *d d*, which is part of the gudgeon C, on which the shaft revolves; this cross is firmly attached to the box, by four screw bolts, which pass through the flanch, and also through the ends of the arms of the cross, having nuts screwed on the outside to make all fast. The section, fig. 3, shews the cross *b b*, and box B B, separated, to explain the manner of fitting them together, the inside face of the cross having projections *e e*, which enter the end of the box, and keep the pivot in its true center; thus the bolts have only to hold the gudgeons fast on the end of the box, the principal strain being taken off by this manner of fitting the cross into the box.

When the gudgeon of a wheel, fitted on this plan, becomes

becomes worn out, so as to require a new one, it can be removed, by taking off the four nuts, and a new one applied.

The cross and gudgeon, being of small dimensions, admit of its cylindrical part C being very conveniently turned in the lathe.

The SILVER MEDAL *was this Session voted to Mr.* JOHN PADBURY, *of Speenhamland, for a Carriage Wheel Guard, by which the Wheel is retained safe upon the Axis in case of the Linch-pin coming out. The following Communication was received from him, an explanatory Engraving is annexed, and a Model is preserved in the Society's Repository.*

SIR,

FROM a conviction of the good wishes which the Society, for which you act as Secretary, ever feel for ingenuity, in its various branches, I am induced to lay before you a plan of my invention, for the more effectually giving safety to the wheels of carriages, to prevent their breaking, or to avoid any mischief from loss of that very considerable support, the *Linch-pin*, on the dependence of which the lives and limbs of so many are continually exposed.

The plan I now offer for the investigation of the Society, is calculated to obviate the danger which may arise

arise from such an accident; the great repute it has obtained, and the almost general application of it by the coach proprietors of the Bath and other roads, together with the prevention of many accidents, since its adoption, will, I flatter myself, plead a sufficient apology for my offering it to your notice.

I am, Sir,

Your obedient humble servant,

JOHN PADBURY.

Speenhamland, Oct. 1812.

To C. Taylor, M.D. Sec.

The following gentlemen, residing in this neighbourhood, have inspected the apparatus, and much approve of it. They have done me the honour to affix their names in testimony of its utility.

Joseph Andrews,	Charles Dundas,
William Hallett,	John Disney, Junr.
James Croft,	Anthony Bacon,
John Wells,	Francis S. Stead.
Richard Boucher,	

Reference to the Engraving of Mr. John Padbury's *Guard, for a Carriage Wheel, by which the Wheel is retained safe upon the Axle, in case of the Linch-pin coming out. Plate* 14, *fig.* 4, 5.

This contrivance can be applied to any carriage, as it does not require any part of the carriage, or axle-tree, to be

Fig. 1.

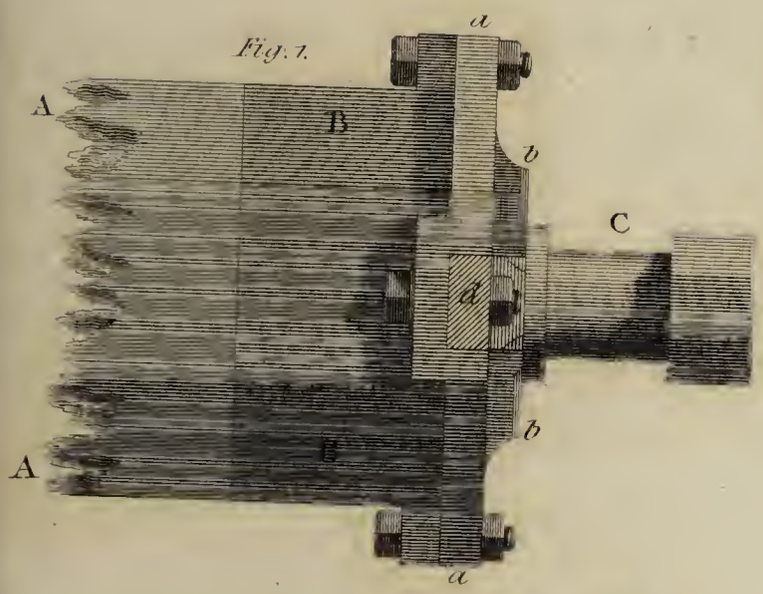
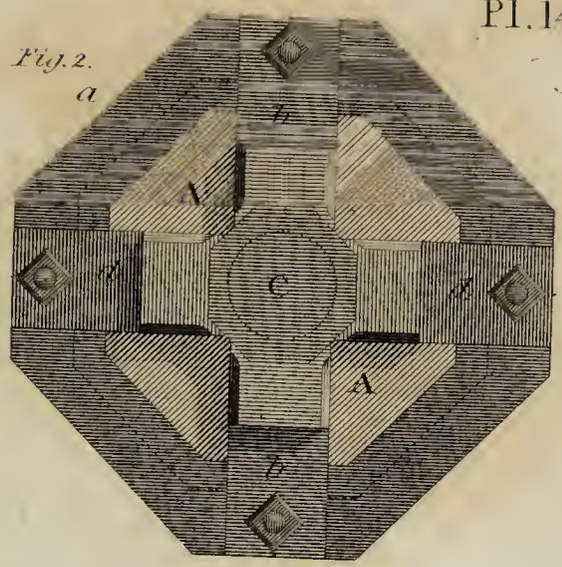
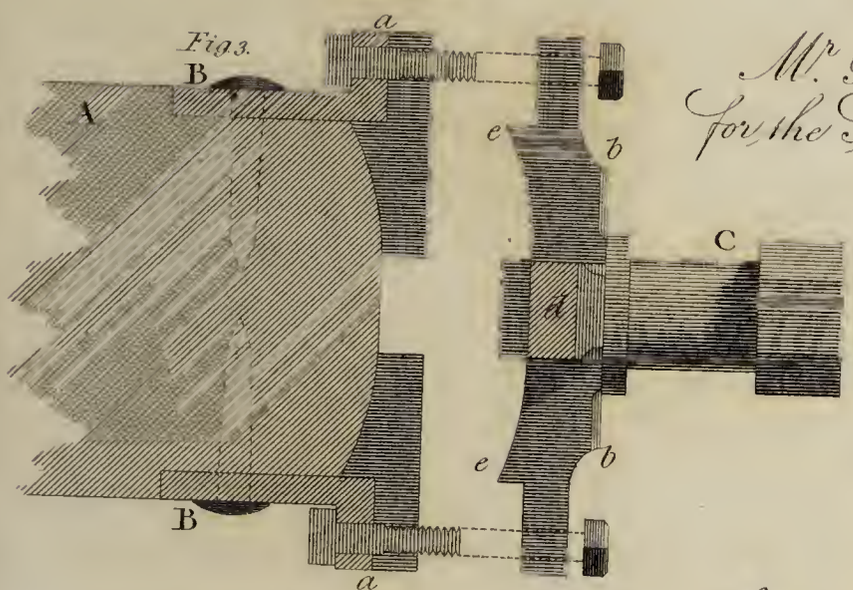


Fig. 2.



Mr. R. Hughes's Gudgeon for the Shaft of a Water Wheel.

Fig. 3.



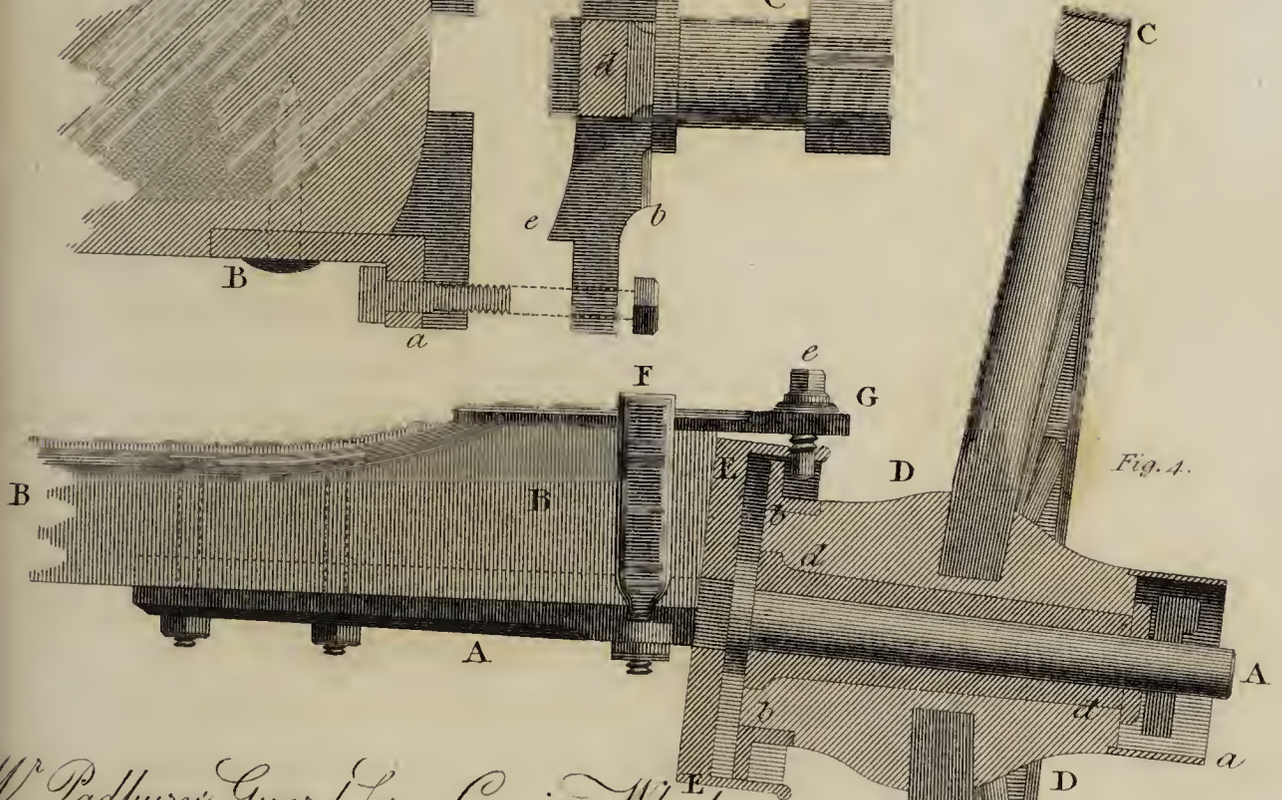


Fig. 4.

Mr. Padbury's Guard for a Carriage Wheel.

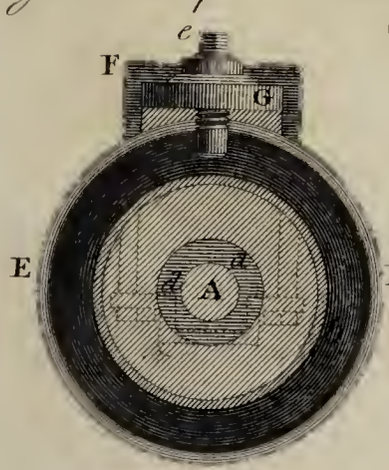


Fig. 6.

Drawn by J. Farey.

Engraved by J. Davis

be altered, farther than the addition of an extra iron hoop upon the inner end of the nave of the wheel.

This is fully explained by figs. 4 and 5, Plate 14, the former being a section, lengthways, of the axletree, and the latter a transverse section; A A represents the iron axletree of a carriage, bolted beneath the wooden bed B B, or frame, of the carriage; C C is the wheel; D D its nave, the axletree box *d d* being fitted through the center of it as usual; *a* is the linch-pin, passing through a mortice in the end of the axletree; E E is a circular box, fastened to the bed B B of the carriage, and surrounding the inner end of the nave of the wheel, to prevent dirt from getting into the axletree; the extra hoop, before-mentioned, which is fixed on the end of the nave, is contained within this box, and runs round without touching it; it consists of a strong hoop *b b*, fixed fast upon the nave, and having a flat circular ring, formed out of the same piece with it: the latter, when fixed, makes a circular projecting rim, upon the end of the nave, as the figure plainly shews.

The same clasp band F, which, by means of two nuts beneath, fastens the axletree A A to the bed of the carriage, also fastens down a piece of iron, G, upon the bed B; in the extremity of this piece of iron is a hole for the reception of a screw *e*, the point of which enters within the box E E, and comes before the projecting ring *b b*, so as to effectually prevent the wheel from coming-off its axle, even if the linch-pin should by accident drop out; the point of the pin *e* is so situated as not to come in contact with the plate *b b*, when the linch-pin is in its place, therefore it occasions no friction to retard the motion of the carriage.

When it is required to take off the wheel, for the purpose

pose of repairs, or for greasing the axletree, the screw *e* is taken out, and the linch-pin being removed, the wheel can be taken off.

In the 27th Volume of the Society's Transactions, at p. 147, will be found a description of an invention, by Mr. J. Varty, of Liverpool, to be applied to the linch-pin of a carriage, to prevent the wheel coming off its axle, if the linch-pin should drop out; this contrivance being wholly applied at the extremity of the axletree, close to the linch-pin, it may be used in combination with Mr. Padbury's invention, and would then render a carriage so secure that it would be scarcely possible for the wheel to come off, by any accident short of the breaking of the axletree: and even then there would be a chance of the wheel being retained, in the circular box E E, by the point of the screw *e*, so as to sustain the carriage from falling, until the horses could be stopped.

The

The LESSER SILVER MEDAL *of the Society was this Session voted to Mr.* J. WHITFORD, *St. Bartholomew's Hospital, for a Mechanical Substitute, for Leeches, in Bleeding. The following Communication was received from him, an explanatory Engraving may be found in Plate 3, and the Apparatus is preserved in the Society's Repository.*

To the Society for the Encouragement of Arts, Manufactures and Commerce.

GENTLEMEN,

I HAVE taken the liberty of offering myself a second time to your notice, and to lay before you a small apparatus I have lately invented, as a substitute for leeches: a desideratum particularly to be cherished, when it is recollected, in severe frosts, leeches cannot always be procured, and very often at too great a price for the afflicted necessitous to obtain. My invention consists of a small spring instrument, with three triangular pointed lancets, which can be regulated to any degree of depth that may be required; the rest of the apparatus is a small exhausting syringe, with three glasses, of different sizes, to be applied as the nature of the case may require; as frequent complaints have been made by medical men, who were in the habit of using the exhausting syringe and glasses for cupping, that after they had applied the glass, in the usual way, with the pump, if they withdrew the syringe from the glass for the purpose of applying others, the air would frequently get under the valve and cause the glass

glass to fall off; and I feel happy in stating, that I have completely succeeded in the improvement I have made on the cup of the glass, which will prevent the possibility of that occurrence. Notwithstanding the many alterations I have been making on the apparatus for the last four years, I found that I was in the exact situation, as to the mode of applying the glasses, as gentlemen who were in the habit of using the exhausting syringe and glasses for cupping. I could but apply one glass at a time without the danger, if I removed the syringe, of the glass falling off, as it most frequently happens you have occasion to apply two or more leeches. I found it therefore necessary to make a further improvement on the instrument, that you might apply as many glasses at a time as you might think proper, which is done as follows:—I made a small stop cock, on the cap of the glass, under the valve, which, when the glass and syringe is used in drawing up the skin, by turning the stop cock, makes it completely air-tight, so that it is impossible for the glasses to fall off, until you may think proper to remove them. I have the pleasure of presenting several certificates from some of the most respectable of the faculty, who have obligingly given me their opinion; and if you, Gentlemen, should require further explanation respecting my artificial leeches, I will with pleasure attend your summons; and remain,

Your most obedient, grateful,

and very respectful servant,

J. WHITFORD.

Saint Bartholomew's Hospital,
Nov. 18th, 1812.

CER-

CERTIFICATES.

SIR,

I HAVE had frequent opportunities of using your leech instrument, and am happy to inform you, that it has answered far beyond my expectation. I have found it particularly useful in many cases where the indigent class of people have stood in need of leeches, but from the high price could not procure them. I have also found it very convenient in two cases, where the patients had a great aversion even to the sight of the leech, consequently the instrument proved to them its most beneficial effects.

I am, Sir,

Your's, &c.

W. H. ELLIOTT,

Apothecary to the City Dispensary.

City Dispensary, Oct. 20th, 1812.

TO MR. J. WHITFORD,

&c. &c. &c.

SIR,

HAVING attentively examined the instrument you put into my hands, as a substitute for leeches, I am of opinion, that it will afford a valuable means of supplying any deficiency of that very useful reptile, which, from its dearth and scarcity, cannot be employed in many cases.

I am, Sir,

Your very obedient servant,

MICHAEL BARTLETT.

Finsbury Dispensary, St. John-street, Nov. 13th, 1812.

TO MR. J. WHITFORD,

&c. &c. &c.

SIR,

SIR,

I HAVE made use of your artificial leech, and from my experience, I think it will prove of great utility. In cases where leeches are necessary I think it will answer every purpose, and in many instances will be preferable. The operation can be performed much cleaner, with considerably less fatigue to the patient, and the quantity of blood taken away can be ascertained with more accuracy than if drawn by the natural leech. The extravagant price of leeches often puts it out of the power of the lower class of people to procure them; and frequently, when procured, they will be found sickly, and their power of action so languid as to disappoint the hopes of the patient, and the expectation of the practitioner: a disappointment which is prevented by the artificial leech; and where prompt and immediate bleeding by leeches is necessary, the possession of the artificial leech appears to me obvious and very desirable.

I am, Sir,
With the best wishes for the
success of your invention,
Your humble servant,

J. DEARING.

Aldersgate-street, Nov. 18th, 1812.

TO MR. J. WHITFORD,
&c. &c. &c.

WE are of opinion that the instrument produced by Mr. Whitford, cannot supersede the use of leeches, but that

that it may occasionally prove a useful substitute for them.

(Signed) JOHN PEARSON,
JAMES WILSON,
THOMAS RAMSDEN,
J. C. CARPUE,
THOMAS MAINWARING,
S. COOPER,
HENRY EARLE.

November 24th, 1812.

I HAVE used Mr. Whitford's leech instrument, and approve the same; I consider it a very ingenious contrivance, and will become an excellent substitute for leeches.

J. W. SPRY, Surgeon.

Charter-House-square, Nov. 24th, 1812.

To C. TAYLOR, M.D. SEC.

SIR,

I HAVE great pleasure in being enabled to say, that whenever I have used your artificial leech, it has fully answered my expectations; and I cannot help thinking, that during the winter season, when leeches are so exceedingly expensive, and when generally they are more wanted, it will prove a valuable substitute. The addition of the stop cock, as it will preserve a more *perfect vacuum*, will enhance its value.

I am, Sir,
Your humble servant,

JOHN BARNETT, Surgeon.

105, *St. John-street.*

To MR. WHITFORD,
&c. &c. &c.

Reference to the Engraving of Mr. J. WHITFORD'S *Mechanical Substitute for Leeches. Plate 3, figs.* 1, 2, 3.

THIS instrument operates nearly in the same manner as the scarificator and cupping-glass, but in a more delicate way; the piercing instrument being provided with sharp points, instead of lancets, so as to make three very small punctures in the skin (instead of incisions, as by the scarificator); upon these a small glass cup is applied, and a syringe used to exhaust the air from it, and increase the flow of the blood.

Figs. 2 and 3, shew the form of the instrument, called the leech; the former being a section through the middle of it, and the latter shewing its outside; it is a brass tube A, having a cover B at one end, through which a screw C passes; this screw has a circular piece of brass *a* fixed upon it, which slides in the tube, and carries the three piercers *b*; a spiral spring surrounds the screw, and presses upon the piece *a*, so as to force it always towards the open end of the tube; but a milled nut *b*, upon the screw C, prevents it going too far; *d* is a small spring catch, fixed within side the tube, and having a button *e* proceeding from it, through the side of the tube; the catch passes through a small square hole in the piece *a*, and has a kind of hook formed upon it, of a similar shape to the hook of a door latch; this, when the screw C is drawn back, by pulling its nut *b*, retains it as shewn in the figure, the spring being fully bent; and in this state the open end of the tube is to be applied upon the part where the bleeding is to be performed; then, by pressing upon the head of the button *e*, the spring catch *d* is discharged, and the spring throws the piece *a* forwards, causing the points

points *b* to enter the skin, and make the punctures, the depth of which is regulated at pleasure by the nut *b*; which being screwed along the screw C, allows the points to protrude as far beyond the end of the tube as the operator's judgment directs, when the spring is discharged.

Fig. 1, is the syringe and cupping-glass, to be applied after this operation; E is a small glass bell, of which there are several of different sizes provided; it has a brass cap *f*, terminating in a screw *g*, by which it is attached to the end F of the syringe G; this exhausts the air, when the handle H is drawn out in the usual manner; a small valve of bladder being tied over the aperture in the end of the screw *g*, to prevent the re-entrance of the air, when the handle of the syringe is returned; *h* is a small stop-cock, to shut up the passage when the exhaustion is complete, as the valve alone would sometimes be insufficient to prevent the leakage of the air, when the syringe is unscrewed.

The SILVER MEDAL *was this Session voted to Mr.* JOHN STEPHENS, *of Reading, for a cheap Wooden Forcing-Pump, to raise Water from deep Wells. The following Communications were received from him, an explanatory Engraving is annexed, and a Drawing of the Pump is preserved in the Society's Repository.*

SIR,

I HAVE sent for the inspection of the Society a cheap Pump, of my invention, by which I draw water from a

well 66 feet below the surface of the ground. I think this pump will be very useful in the country, where the water in wells is too deep for common pumps. I consider it to be the best and cheapest wooden pump in use, and the greatest part of it may be made by any common carpenter.

The whole expense of this pump and apparatus was £. 25, and it raises the water 66 feet high. The lower part of the pump-tree is four inches in the bore. The lower part of the rod which passes through the stuffing box is made of brass; the elbow and upper pump-trees are of a two-inch bore, and may be easily made of any kind of wood. It may also be made to act as an Engine for extinguishing fires, by the addition of an air-tight vessel and pipe to its upper part.

I am, Sir,

Your obedient humble servant,

JOHN STEPHENS.

Reading, April 7th, 1813.

To C. Taylor, M. D. Sec.

SIR,

Agreeably to your desire I have put the experiment of my pump in practice. By the power of two men I throw water easily to the height of 18 feet above the surface of the ground, and with a pretty regular stream. I could have thrown it higher if the engine pipe had not been too large. This I consider as a useful method of watering gardens or roads, or to extinguish a fire, if it should happen near to a pump of this kind. It will also fill a cistern at any moderate height.

I have

I have introduced in the drawing a cap and screw, in preference to screwing it to the nossel of the pump, as it is stronger and more to be depended upon; and I would recommend a screw when water is to be raised to a great height, to be made to fit the nossel, that every thing may be ready always for immediate use. The work of this pump is not liable to be injured by frost. Where the well is of considerable depth I would recommend a brass or metal barrel for the piston to work in.

These pumps may be useful for ships, in preventing fire on board. It has been suggested, that cast-iron pipes would answer better, and be cheaper than wooden ones; but this can scarcely be the case, when it is considered the little expense at which these pipes may be made from fir and elm boughs, or beech poles. I have been told, by Mr. George Sims, a person in the habit of making pumps, that he has known beech pump-trees to last sixty years and upwards.

I shall always be ready to give any further information that may be desired upon the subject; and am, with best respects, Sir,

Your's, very sincerely,

JOHN STEPHENS.

Reading, June 11th, 1813.

To C. Taylor, M.D. Sec.

Reference to the Engraving of Mr. Stephens's *Forcing Pump, in Wood, for deep Wells. Pl.* 15, *figs.* 1, 2, 3, 4.

Fig. 1, Plate 15, is a section of a well, in which a pump of this kind is fixed; A A, represents the surface of the ground, and B B, the brick-work of the well, in which

the water stands at the level C, and is, by the pump, to be raised to the surface A A.

D is the lever or handle of the pump, which has the rod *a* jointed to it, and descending to the pump; the rod is made of wood, in several lengths, which are united by joints of iron, in the manner shewn at fig. 4; the wooden rods, *a a*, being capped with iron forks *b*, which include the ends of them, and are rivetted fast; the ends of the forks are jointed together to connect the several lengths.

E is the working barrel, or chamber, of the pump, in which the bucket *d* works; this part is formed of a tree, bored through, and having a projecting branch *e*, which is likewise bored obliquely to the barrel, and forms the forcing pipe; in the bottom of the barrel the suction valve *f* is situated, being at the top of the suction part of the pump, which is bored with a smaller auger than the working chamber, which is also lined with a brass tube, where the bucket works. The top of the barrel is covered by a metal lid *g*, (see also figs. 2 and 3,) which has a stuffing box in the center to receive the metal cylindrical part of the pump rod *h*; to the lower extremity of this the bucket *d* is fixed. The metal lid consists of a ring, which is screwed to the wooden barrel by five screw-bolts, passing through as many ears, projecting from the circumference of the ring; they have eyes below, to hook upon pins, which are fixed in the wood, but project sufficiently for these bolts to hold, and are formed into screws above, so as to hold the ring firmly down, by means of nuts screwed upon them. The moveable lid of the pump, which has the stuffing-box *g* formed in the center of it, is screwed to the ring, by five screws, and these can be taken out to remove the lid, and draw up the bucket when it requires to be leathered.

F is

Mr. Stephens Forcing Pump.

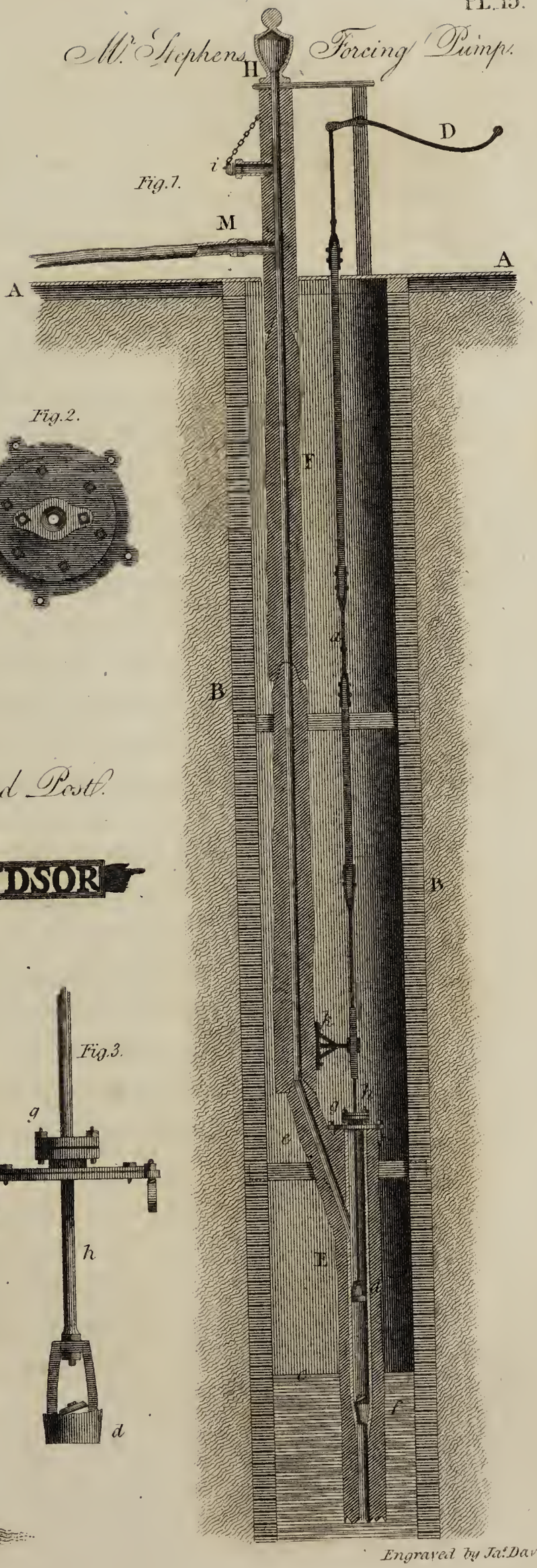


Fig. 1.

Fig. 2.

Mr. Ja.s Swaine's Hand Post.

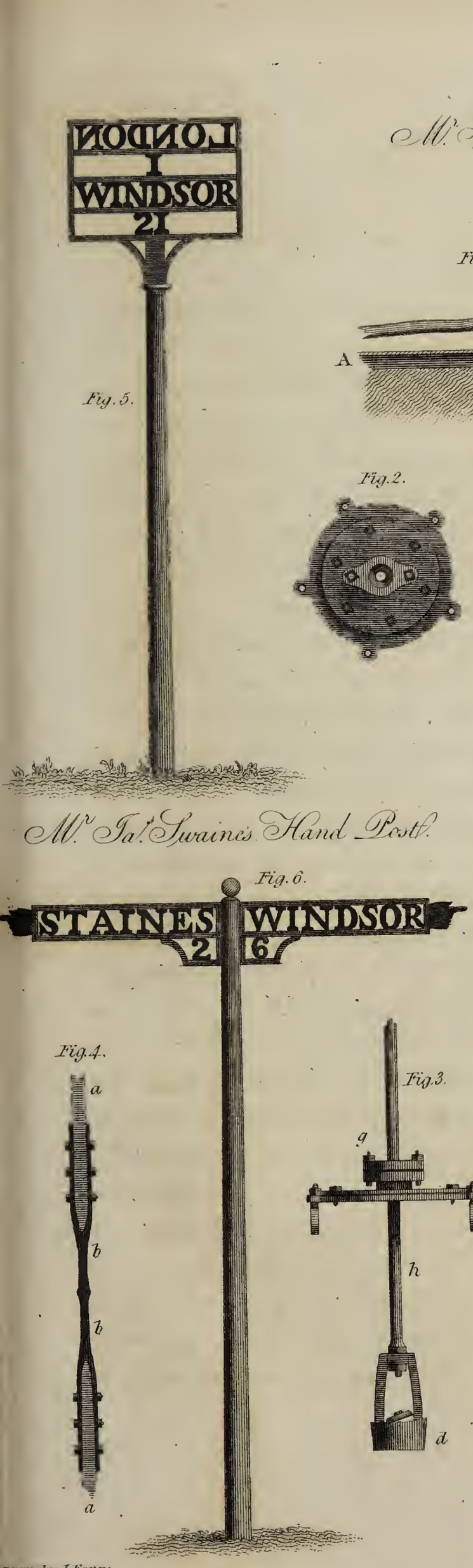


Fig. 5.

Fig. 6.

Fig. 4.

Fig. 3.

Engraved by Ja.s Davis

rawn by J. Farey.

F is the forcing pipe, formed of as many pieces of wooden pipes as is required to make up the length; they are united together by making the upper ends conical, to enter a similar cavity, made in the lower end of the next pipe; the lowest piece fits upon the extremity of the projecting branch *e*, and a valve is proposed to be put in the pipe, at this joint, to prevent the return of the water, and bear part of the weight of the column from the lowest valve at *f*; the upper length of the pipe has a spout *i*, at which the water is delivered.

M is a second spout, fixed into the pipe lower than the former; it has a screw, by which it can be united to a hole, or leather pipe, to convey the water to a distance: or by means of a jet, or branch-pipe, to throw it in the manner of a fire engine; in this case the upper spout *i* must be stopped up, by a screw plug or cap; and there is a copper air-tight vessel H, situated at the top of pipe F, to equalize the pulsative motion of the water, as thrown by the pump.

k is a bracket fixed to the pipe F, and projecting over the center of the pump, where it has a hole to receive the pump rod *h*, and guide it steadily in its motion up and down, that it may not wear the stuffing box away on one side. As the wooden tubes of which the forcing pump F is composed may be made from waste or crooked timber, it makes a great difference between the low price of such, and that of the straight trees necessary for common pumps.

A wooden plug may be chained to the pump, betwixt the spouts or nossels M and *i*, so as to be ready to stop that which is not wanted in use.

Mr. Stephens is of opinion, that it is better to place the valve *f* above the level of the water in the well.

The LESSER SILVER MEDAL *was this Session voted to Mr.* JAMES SWAINE, *Piccadilly, for an improved Guide-Post, the Arms of which are made of Cast-Iron, with open Spaces between and within the Letters, so that they can be more easily distinguished either by Day or Night. The following Communication was received from him, an explanatory Engraving is annexed, and a Model is preserved in the Society's Repository.*

SIR,

ANY thing which may contribute to the safety and convenience of travelling cannot fail to excite a lively interest in every person who is accustomed to travel either for pleasure or business. The deficiency of direction-posts throughout a great part of the kingdom, and particularly in the cross roads (where the necessity is most evident) together with the mutilated condition by the weather, from want of repair, and from other causes, of the greater part of those which are put up, have long been to travellers sources of well founded complaint: the frequent inconveniences, not to say serious accidents which have occurred, urge the necessity of the adoption of some better mode for directing the benighted traveller to his desired destination: the most eligible plan which has presented itself is, to have the letters made of cast-metal or iron, that by the appearance of the sky through the interstices, they will be legible by night as well as by day, an advantage which must be obvious to every one: the expense, which will be one shilling per letter, will be found considerably less than that of wood,

wood, when the durability of the former is opposed to the fragility of the latter. If this plan was generally adopted, no longer would the fatigued traveller pursue an ambiguous road; no more would he be deceived by the delusive hand-post, which, when arrived at, presents to his great disappointment nothing but an extended arm rendered totally useless by the unchecked ravages of time!—This is no chimera, but has frequently been the situation of the projector, and which indeed first suggested to him the idea of his invention, a specimen of which is sent to the Society for their inspection and opinion.

I am, Sir,

Your most obedient Servant,

JAMES SWAINE.

The same plan may with equal utility, be extended to distance posts.

No. 238, *Piccadilly, Nov.* 11*th*, 1812.

To C. Taylor, M. D. Sec.

SIR,

Since I had the honour of sending the model of a guide post, which was approved by the Society, I have made an improvement by placing the distance in the bracket, which adds considerably to its strength and utility. I have the pleasure of acquainting you, that they are likely to be generally adopted. Sir Wm. Gibbons has erected some in the parish of Stanwell, and others will also be erected in that of Almsworth, and in Devonshire, Oxfordshire and Salop:—Some of the Commissioners of the roads

roads have promised to adopt them, and the Surveyors have so far approved of them as to express their intention of introducing them in the drawings where the new roads are to be. I am informed that new roads are about to be made in the Isle of Wight, and that posts according to my plan will be there erected. The model which I have sent includes the improvement.

I am, Sir,

Your obedient Servant,

JAMES SWAINE.

Piccadilly, March 3d, 1813.

To C. TAYLOR, M. D. SEC.

Reference to the Engraving of Mr. JAMES SWAINE'S *Cast-Iron Hand-Post. Plate* 15, *figs.* 5, 6.

Figs. 5 and 6, are two different forms in which this hand-post may be constructed, in the former, two lines of letters are placed one above the other, and included in a square cast-iron frame, placed on the top of the post or stem; the whole is made of cast-iron, the letters consisting of small bars with spaces between them, open, so as to see the light through them, by which means the characters of this hand-post will be legible at night by viewing them against the sky, unless it should be exceedingly dark. The direction of the road is denoted by the manner of disposing the letters, thus in fig. 5, the letters of the word LONDON are reversed, to denote that the direction of London is to the left hand; the word WINDSOR in the line beneath is not reversed, and therefore shews that town lies

lies to the right hand, the number of miles to each place is shewn by figures placed beneath each word, as in the Engravings. In fig. 6, is shewn a hand-post very nearly of the common form, but made in cast-iron with open work; it has two arms which project from the opposite sides of the post, and therefore shew at once the directions of their respective towns; the distances in miles are denoted by figures likewise in open work placed in brackets beneath, and which also serve to support the arms close to the post. These hand-posts would not be expensive if any iron founder was to establish a manufacture of them, for then the patterns to cast them from might easily be made up from loose letters fixed in a frame in the same manner as printing types, so that 2 or 3 alphabets would be sufficient for forming hand-posts for any places which could be required. Their durability, independent of their other advantages, should forcibly recommend this invention to the attention of the trustees for turnpike-roads.

The LESSER SILVER MEDAL, *and* FIVE GUINEAS, *were this Session voted to Mr.* A. YOUNG, *Jun. of Bury-street, Bloomsbury, for his Invention of a Fire Escape Ladder, formed instantaneously by the external application of a Jointed Pole to a Window. The following Communication was received from him, an explanatory Engraving is given in Plate* 6, *and a Model of the Ladder is preserved in the Society's Repository.*

SIR,

THE many accidental fires, some of which are attended with the most melancholy results, by persons inhabiting the upper apartments (when the fire originates in the lower part of the house) not having the means of saving themselves, have induced me to present the model of a fire escape, which, from the simplicity of its construction, its portability, as it can be conveyed under the arm of any person with the greatest ease, and the very trifling expense attending its making, will I trust, be found deserving of the approbation of the Society.

This escape is so constructed to be at all times serviceable to the person possessing it, as it can be hooked to the front of the window of his apartments, and he will be able to descend by means of a rope ladder; should his neighbour's house be on fire, and any one in need of assistance, he can raise it to the highest part of the house from the street by fixing the joints at the end of each step together, in the manner of a fishing rod, beginning with the hook which is to be placed in the socket of the top step, the other

other end of the top step to be placed in the socket of the one beneath it, and the same with every other step, which will form as it were a small rod, which may be rested against the wall of the house, by the side of the window, where the person in danger is, who will place the hooks properly, which are made sufficiently large to embrace the thickness of the wall, then, by pulling the ropes at the bottom, each step will be drawn from the socket of the other, and the ladder will be formed. The ropes at the bottom will enable persons in the street to steady the escape, and keep it from the wall.

If, Sir, you will have the goodness to present it to the Committee, at the earliest meeting, you will much oblige,

Sir,

Your obedient Servant,

ADAM YOUNG, JUN.

No. 16, *Bury-street, Bloomsbury,*
April 21, 1813:

To C. TAYLOR, M. D. SEC.

Reference to the Engraving of Mr. YOUNG's *Portable Ladder Fire Escape. Plate* 6, *figs.* 4, 5, 6.

THIS ingenious contrivance consists of a number of rounds, A, fig 5, forming the steps of the ladder by being united with two ropes B B, which are suspended from an iron frame C, terminating in hooks *a*, which can very conveniently be lodged on the sill of a window, and thus form a convenient ascent, as is shewn in fig. 5; being very nearly the same as the common rope ladders used on board a ship;

a ship; the principal part of the contrivance consists in making the ladder, so that the rounds can be put together in the manner of fig. 4, forming a pole, by which the frame *c*, can be raised up to the window from below; to effect this the ends *e*, of the rounds A, have ferrels fitted fast upon them, and the other ends *f*, are reduced, so as to enter the cavities of the ferrels, which project beyond the end of the wood so as to form sockets for their reception: the iron frame *c*, at the top has a projecting pin *d*, which is connected with the end socket *e*, of the upper round, thus fixing it at the top of it; the small end of this is inserted into the ferrel of the second, which is again fixed at the top of the third, and so on to the bottom, thus a pole is formed as in fig. 4, of all the staves of the ladder united together; by this, the hooks *a a*, at the top of the iron frame, may be raised up to a window cell, and then a single jerk, or pull at the lower end, disunites the staves from one another, and they assume the form of fig. 5, ready for ascending or descending.

The ropes B B, of the ladder are composed of three small lines plaited together, which method gives the means of fastening the staves very securely to them; this is shewn by fig. 6; a hole is bored through the stave at the place where the rope is to be fixed, large enough to receive one of the three lines, and a groove is turned round the outside of it at the same place; then one of the lines are passed through this hole; and the other two passed round in the grooves on opposite sides so as to surround the stave, then all the three being plaited together, make as firm a connection as possible.

The frame C, at the top has two iron rods *b b*, fixed to its sides, which are useful as hand rails to a person getting out of a window upon the ladder; this frame, though large,

does

does not take up any room when the ladder is packed up, because all the staves laid are parallel and rolled up into a bundle, which fits into the curved inside of the frame C, and the whole is tied together by two lines fixed to the ends of the ladder, which serve also to guide and keep it free from the area, rails, &c. of any house.

The SILVER MEDAL *was this Session voted to Mr.* H. R. PALMER, *of Mare-street, Hackney, for his Invention of a Guage, for the purpose of marking a Line along the Centre of any Parallel or Inclined Surface; also for finding the Centre of a Circle, Square, or any regular Polygon. The following Communication was received from him, an explanatory Engraving is annexed, and the Guage is preserved in the Society's Repository.*

SIR,

HEREWITH you will receive a guage which I have invented, for the purpose of marking a line along the centre of any parallel or inclined solid, which I beg to introduce to the Society of Arts, &c. through your hands.

It has been approved by several workmen, to whom I have shewn it. It will mark a centre line with great accuracy, and it is more easy for a workman to measure from a centre line formed. It will assist greatly in making

ing mortices, and will answer also all the purposes of a carpenter's common guage. It will cost about four shillings.

I am, Sir,

Your humble Servant,

H. R. PALMER.

At Mr. Donkins, Fort-place, Bermondsey, March 3d, 1813.

To C. Taylor, M. D. Sec.

Reference to the Engraving of Mr. Palmer's *Gauge, for marking a Line along the Center of any Parallel or Inclined Surface; also for finding the Center of a Circle, Square, or any regular Polygon. See Plate* 16, *figs.* 1, 2.

Fig. 1, of Plate 16, is a plan, and fig. 2, a perspective view of the gauge, the same letters refer to both figures, the first being drawn at exactly half the real dimensions of it. A A is a square bar of hard wood planed straight, having the two cheeks of wood B D fitted tight upon it, the cheek B, is fixed fast on the end of the bar, whilst the other slides freely upon it, but may be clumped fast, at any required place, by the thumb-screw C; at the end *b*, a common scribing point is fixed in the bar, and with this, and the sliding piece D, it forms the common guage used for describing parallel lines from the edge of any piece of wood-work; the addition made by Mr. Palmer consists of two brass arms E and F, of equal length, which are centered

centered in the two sliding-boards, or cheeks, at *a a*: the other ends are jointed together by the screw G, which is formed into a sharp point beneath to mark the work with. In using this gauge its two cheeks B D, must be set to the width of the piece of wood intended to be scribed and applied, as shewn in fig. 2; it must be evident, that the point of the screw G, will always keep in the center between the two cheeks B D, because the two arms E F, are of equal length, and a line joining their centres *a a* is perpendicular to the cheeks; it may also, as before stated, be used in the manner of the common carpenter's gauge by means of the sliding cheek D, and the marking point projecting below the bar at *b*. This tool will prove much more expeditious in use than the usual method practised by carpenters for finding the centre of any piece of board, &c. viz. by setting the common gauge, as near as can be estimated, to the centre of the piece, and making a mark, and then turning it to the opposite side of the piece, and making another mark, between which, if the distance is made very small, will be found the center, near enough for common purposes.

If the piece of work to be gauged is not parallel in its width, then the screw C must be loosened, and the two cheeks kept pressed together with sufficient force to keep them in contact with the two sides of the work, when the point G will traverse along the center as correctly as if it was parallel; because, in all situations it preserves an equal distance between the two cheeks. The two cheeks have grooves in them to admit the brass arms E and F, when the cheeks are brought into contact.

FIVE GUINEAS *were this Session voted to Mr.* JAMES STONE, *No.* 30, *Warwick-street, Golden-square, for an expanding Centre-Bit, by which Circular Holes of various Diameters may be made. The following Communication was received from him, an explanatory Engraving is annexed, and the Instruments are preserved in the Society's Repository.*

SIR,

HAVING invented an expanding Centre-bit for boring holes in wood, from about one inch to nine inches in diameter, and being advised by many persons who have seen it, to lay it before the Society of Arts, &c. I request the favor of you to submit it to their consideration, as it will in many cases accelerate the business of carpenters and other workmen.

I am, Sir,

Your most obedient humble Servant,

JAMES STONE.

No. 79, *Great Titchfield-street, Oxford-market, March* 3*d,* 1813.

To C. TAYLOR, M. D. SEC.

Reference

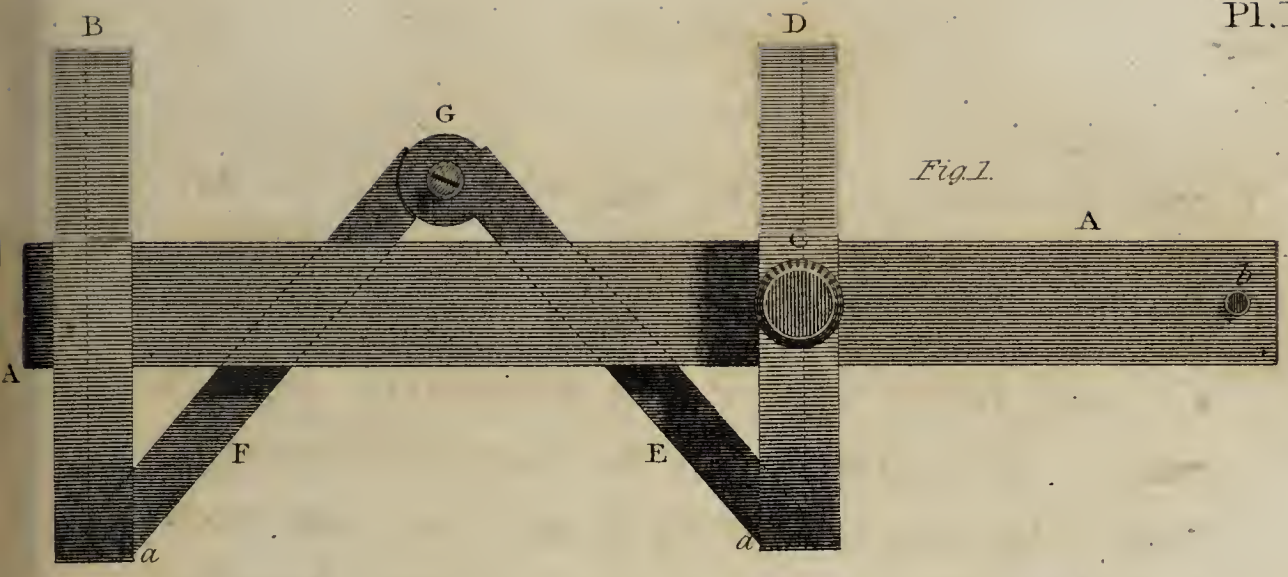


Fig.1.

M.r H.R. Palmers. Gauge for marking Center Lines.

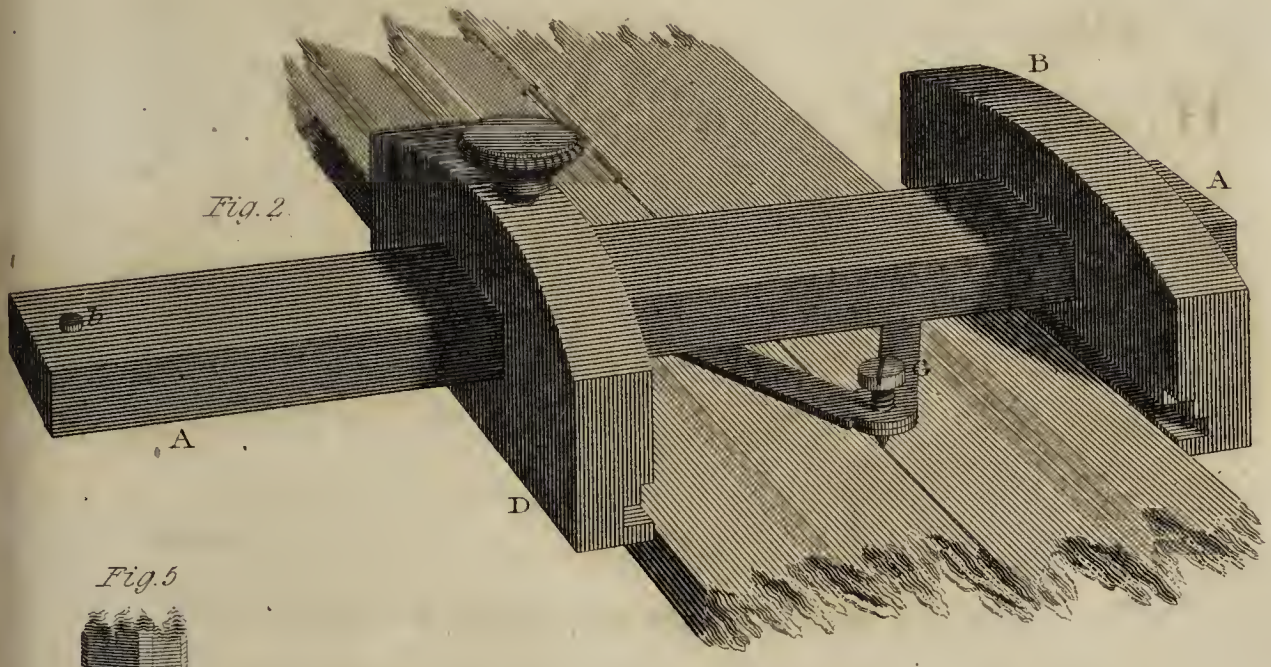


Fig.2

Fig.5

M.r James Stones. Expanding Center-bits.

Fig.6.

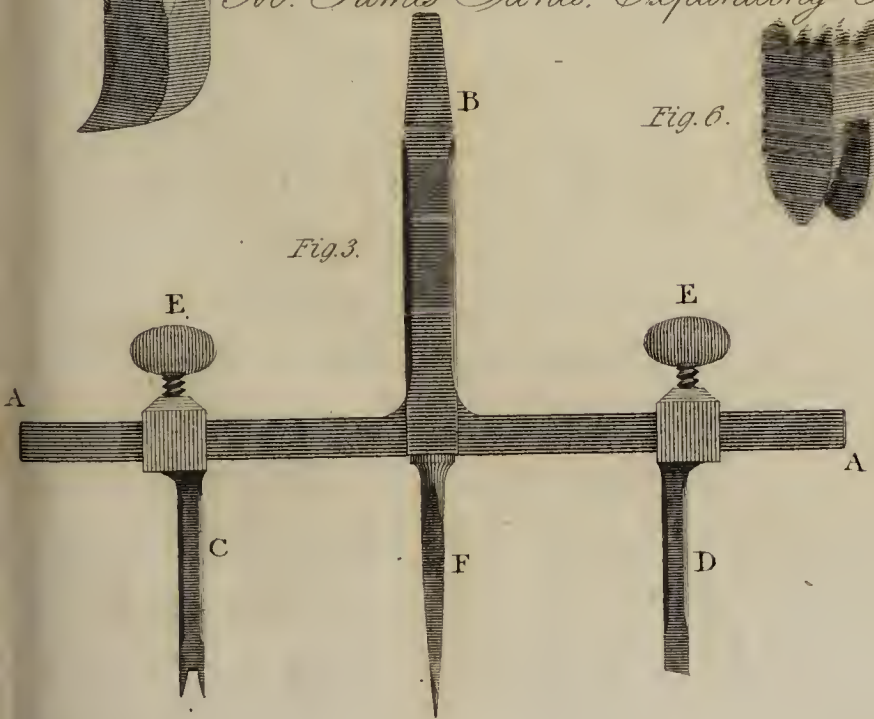


Fig.3.

Fig.4.

Drawn by J.Farey.

Engraved by Ja.s Davis.

Reference to the Engraving of Mr. STONE'S *expanding Center-Bit, for boring different sized Holes through Boards, and without wasting the Pieces which are cut out, or employing more Labour than is necessary. See Plate* 16, *figs.* 3, 4, 5, 6.

FIGS. 3 and 4, of Plate 16, explain two different methods of constructing these center-bits; fig. 3, being for forming very large holes, even as much as 9 or 10 inches in diameter; whilst fig. 4 is for smaller sizes; but the principal convenience of either is, that it can be set to any required size within its limits. The large tool, fig. 3, consists of a straight bar of iron A A, with a shank B, projecting perpendicularly from it, and formed into a square at top, to be received into a stock or brace, in the manner of a common centre-bit; C D are two cutters sliding upon the bar A, and may be fixed by the screws E E, at any distance from the center-pin F, to regulate the diameter of the hole intended to be cut out. The center-pin F is screwed into the underside of the bar, and its bare and sharp point projects some distance below the edges of the two cutters C D; the cutter C is made rather longer than D, and is formed into two sharp cutting edges, and prevents the wood from splitting up, and making an uneven hole, by cutting two parallel lines round the circle, for the other cutter D, to follow in, and take out the wood between the lines.

The form of these cutting edges is shewn on a larger scale in figs. 5 and 6, the latter shewing the two sharp scribing edges to cut the sides of the circular groove; and the other, the sharp hooked edge, which cuts up the wood from between them, in the manner of a chissel.

Fig. 4, shews the construction recommended for smaller expanding centre-bits, the shank A is swelled out at its lower part into a square D, large enough to have a mortise through it for the reception of two arms, which are bent down at right angles at the ends, and form the two cutters B C; these arms lie beside each other in the mortise, and can be removed from the center both ways, to the size of the intended hole, both being bound fast in the mortise by the screw D; the center-pin E, and the two cutting edges, are like those shewn on a larger scale at figs. 5 and 6; the one, fig. 6, coming first into contact with the board to be perforated, makes two deep lines in it, parallel to each other, and of the same distance apart as the width of the opposite cutter, which is shewn at fig. 5, and has a sharp edge formed on a surface rather prominent, so as to cut the wood out between the lines made by the first cutter.

The middle point F, is made pointed and sharp, in order not to impede the action of the cutters when in use.

PAPERS

IN

COLONIES AND TRADE.

The GOLD MEDAL, *the Premium offered for curing British White Herrings, was this Session adjudged to Mr.* JOHN LEWIS, *of Broad Stairs, from whom the following Communications were received.*

SIR,

I BEG leave to inform the Society of Arts, &c. that I have this season cured six thousand five hundred and thirty-three barrels of white herrings, caught in the British seas, a great part of which have been cured after the manner of the Dutch, the others were for the West India, Baltic, Irish, and home markets.

The above is a much greater number of barrels than any other curer hath accomplished in the united kingdom. I have sent to the Society a half barrel as a specimen, and hope they will merit the Society's approbation. The Dutch commence their fishery in the deep sea in the

middle of the summer; the fishery at Broad Stairs, where my herrings are cured, commences about the 10th of October. My herrings are thoroughly impregnated with salt, and for which purpose I prefer the patent English solid salt, which will preserve them good a long time, and even improve their flavor.

I am, very respectfully,

Sir,

Your obedient Servant,

JOHN LEWIS.

8, *Lower Thames-street. Jan. 28th*, 1813.

To C. Taylor, M.D. Sec.

Certificates.

This is to certify, that Mr. John Lewis has cured more than thirty barrels of gypp'd herrings, after the manner of the Dutch, and that the sample of half a barrel sent to the Society by the sloop Speculation is a fair sample of those cured by the said John Lewis.

John Kennett.
Henry Banner.
Robert Barfield.

Broad Stairs, Kent, Jan. 24th, 1813.

Mr. Lewis's *Process for curing White Herrings.*

The process used by me for curing white herrings after the manner of the Dutch, is as follows:—

As

As soon as possible after the herrings are caught, they are gypp'd, by cutting the blood veins of the neck across with a small knife made for that purpose, the small guts are to be drawn out of this incision by the knife, and at the same time the neck piece is to be cut out right under the two fore fins. The herrings must then be thrown into a tub, and well roused (mixed up with salt), and packed immediately whilst bleeding into casks, laying a sufficient quantity of salt between each layer of herrings. Foreign salt has usually been employed for this purpose, but from this year's experience, I find the *British solid salt equal, if not superior,* to any salt I have ever tried, and agreeably to the Dutch system, the herrings must be laid well on their backs in the cask; the casks must be then headed up and laid on their sides for a fortnight or three weeks, then opened and filled up, and so put by ready for shipping. This is the whole of the process.

I am, Gentlemen,

Your obedient, very humble Servant,

JOHN LEWIS.

Broad-Stairs, Jan: 22d, 1813.

To the Society of Arts, &c.

*** The Society, anxious to obtain every possible information upon the subject, procured the attendance of several very respectable Dutch merchants, and other persons from Holland, well conversant in the business of taking and curing herrings, to investigate the herrings sent from Mr. Lewis, and to favor the Committee with further observations upon the subject. They commenced the busi-

ness by a careful examination of the cask sent to the Society, smelling and tasting the pickle, and observing the manner in which the herrings were placed in the barrel. They then took out some of the herrings promiscuously from the cask, and shewed from some ungypped herrings they brought with them, the manner of gypping the herrings, by making an incision nearly in the form of a half circle under the neck, removing the gills and guts, in a similar manner to those cured by Mr. Lewis.

To prepare Mr. Lewis's herrings for eating, they took them from the cask without washing, and cut off a small slip, the whole length of the belly, as useless, an incision was then made the whole length on the back of the fish, and the entire skin of the herring dextrously drawn off, commencing at the throat of the fish. The fish was then cut across obliquely in the direction of the vertebræ, in pieces of three fourths of an inch each, containing the bone in the centre of each, and thus laid on a plate for the table to eat with bread and butter. Some of them were prepared in another mode, by holding the fish, when skinned as before, by the finger and thumb of each hand; and by dextrously turning it over the wrists, the herring was split the whole length, and separated from the bone, leaving the whole fleshy part in two longitudinal pieces.

The Dutch gentlemen, after eating heartily of the herrings, concurred in the following sentiments:—

They declared Mr. Lewis's process of cure to be precisely the same as the Dutch method.

That the Dutch in their cure use generally the best Lisbon salt well crystallized, in the proportion of one thousand pounds weight of salt, to 14 whole barrels of herrings, each barrel containing from 1000 to 1200 herrings, according to their size.

That

That the Dutch commence their herring fishery on the 21st of June, and continue it from 58 to 60 degrees north latitude, to the latter end of August, following the herrings, and continuing their fishery of them southward, from that time to the latter end of October.

That the Dutch always pack their herrings in oak casks, and for the West India trade pack them in small casks, as a cask of herrings will not keep long there after being opened.

That the signs of a good herring are that the fat should run from the hands in opening it, the flesh appearing clear and white, and the flavor not too salt.

That the herrings caught in October, in latitude 40 degrees, are the best calculated for the West India markets, having then shot their roes and become maigre, and will therefore keep better.

That the Dutch herrings will keep good twelve months.

That Mr. Lewis's herrings are extremely good, and equal to the best Dutch, only rather too salt for home consumption. They recommend for the West India trade, that Mr. Lewis's herrings should be repacked in smaller barrels, in the following manner:—The herrings should be laid upon their backs very close to each other, the heads turned towards the outer circle of the cask, that when a layer is thus placed and pressed hard, some salt should be taken up between both hands open, and by a sudden jerk dispersed equally over the layer; the next layer of herrings should be laid directly cross ways of the former, pressed and sprinkled with salt as before, and the herrings thus closely placed, salted and packed, stratum super stratum, till the cask is well filled.

That the herrings are usually eat in Holland as taken from

from the cask, without boiling or other culinary preparation, but that the rows are usually broiled before the fire before they are eat.

TWENTY GUINEAS *were this Session voted to Mr.* THOMAS STILES, *of Norwich, for curing British White Herrings, and the following Communications were received from him.*

SIR,

IN the year 1809, I wrote to you my intention of communicating to the Society of Arts, &c. my process for the cure of herrings. I am not able to produce the thirty barrels, the quantity for which the premium is offered, so that my claim is not for quantity, but *quality.* The herrings which I produced to you in 1809, were deemed by Mess. Fortune & Everett, Fishmongers, in Thames-street, by Mr. Saunders, and also by gentlemen who have travelled on the continent, to be superior to the Dutch. I now submit to the Society a small cask of my curing for their inspection. I have sent my cask of fish unopened; they were cured in November 1811, and deposited in this gallon cask, April 1812. The Committee will discover on opening the cask, that notwithstanding the length of time they have been kept, that they are perfectly free from rancidity, and will continue so for years.

Within the last three months, I have opened some casks

of

of herrings which have been cured three years, and found them perfectly free from rust. I think a similar process will preserve salted provisions of any kind from rancidity.

I am, Sir,

Your obedient Servant,

THOMAS STILES,
of Norwich.

My address whilst in London is at Mr. Banners, No. 25, Tichborn-street, Haymarket.

Dec. 16th, 1812.

To C. Taylor, M.D. Sec.

Certificates.

This is to certify, that Thomas Stiles, of the city of Norwich, was recommended to me in the month of Feb. 1810, as a superior curer of herrings, by Mess. Abbot & Lindsay, Merchants, at the New South-sea rooms, Threadneedle-street.

These gentlemen provided me a sample, which I so much approved, that on certain conditions I offered him £. 10,000 for the discovery, which he declined. In the March following I offered him £. 6000, and £. 300 a year to superintend the English and Scotch fisheries, which he also declined. I then understood he had connected himself with Mr. Patterson, M. P. of Norwich, and therefore dropped all further thoughts of an engagement with him, as witness my hand,

F. Fortune.

No. 16, Albemarle-street, Jan. 8th, 1813.

In

In a subsequent communication from Mr. Fortune, he states, that he still feels the same impression that Mr. Stile's method of cure exceeds any that he has had the opportunity of examining; that he heartily wishes him every success which his industry and invention merits, and shall, on all occasions, render him every service in his power.

SIR,

I RECEIVED a keg of your British cured herrings, on Dec. 19th, 1812, and two kegs on Jan. 7th, 1813, which gave great satisfaction to my friends, among whom I distributed them, and who generally made enquiry where they could be obtained, but knowing your stock was low, and that in a future year you intended to lower the price, I waved the question.

I remain, Sir,

Your obliged humble Servant,

WILLIAM WOOLMER.

Castle-street, Leicester-square, Jan. 1813.

To Mr. THOMAS STILES.

DEAR SIR,

THE general satisfaction your British cured herrings have given, induces me to suggest to you their being made known to the *shipping interest,* being fully confident their superiority will give them a decided preference. If you should think the idea worth attention, I shall feel happy in having promoted your welfare. Wishing you every success, I remain,

Your's truly,

BEN. WILLATS.

No. 19, *Fore-street, Jan.* 1*st,* 1813.

Further

Further Certificates in favor of Mr. Stiles's herrings were received from Mr. DANIEL COPPIN, of Norwich, and Mr. G. ERRINGTON, fish-curer, of Yarmouth.

Mr. THOMAS STILES's *Process for curing Herrings.*

Take 4500 herrings (which will fill 3 barrels of 32 gallons each) procured from the fishermen the day they are caught, and before the setting of the sun if possible. With spring sheep-sheers cut off their heads, and disembowel them by cutting the belly longitudinally about 1-8th of an inch beyond the belly fins, and put the heads, bowels and roes into a copper, with six gallons of water and six pounds of salt, from the quantity allowed by government (which is 140lb. of salt per barrel), boil this mixture slowly for four hours till it becomes a pulp, then strain it through a clean hair sieve, and when you have drained the liquor, cast the dregs into a press, within a horsehair bag, and compress the dregs forcibly to discharge all the contained liquid, when this liquid has stood till perfectly cold, an oil will arise on the surface which must be carefully removed, then press the liquor through a clean hair sieve, and preserve it safe.

After taking off the heads and disembowelling the herrings, as above mentioned, take the bodies and put them into sea water, in a large tub provided for the purpose, 500 herrings at a time, and stir them well about therein with a broom to cleanse them from all filth, then cast them into wicker baskets to drain for about 15 minutes, then take for the three barrels 1½lb. of black pepper ground, 1½lb. of ginger, ¾lb. sassafras powdered, and six pounds of coarse-grained

grained raw sugar, and the remainder of the salt allowed by government; mix these ingredients well together, and put this mixture and your 4500 herrings into a reservoir, and stir them well together with a stirring staff similar to what the brewers use when mashing, let them remain thus for three days, then take three thirty-two gallon oak barrels, and place 1500 fish in each barrel, coopering them up as soon as the fish have shrunk so as to be compressed therein, when coopered place the barrels on their sides, gun fashion, and pour first into each barrel one gallon of vinegar, No. 24, and then add a proportion of the liquor prepared as before mentioned, from the heads and bowels, also that from the salt and spices, all well mixed together, and let the casks be well filled up therewith, and bunged, placing them so as to be rolled about, in order that every part of the barrel be well filled, as the surest means to prevent rancidity. When you have carefully ascertained after rolling for several successive days that your casks are perfectly full, bung them down securely, and let them stand some months, when they will be fit for market.

Observations.

If it so happens, that a larger quantity of fish is caught than your people can discharge of heads and bowels before the sun sets, put those fish which you cannot operate upon, (after first washing them in sea water or salt water) into a reservoir with the quantity of salt allowed by government, stirring the salt and herrings together, then take the first opportunity to take away the heads and bowels, and wash your fish in some of the salt liquor, then boil the heads and bowels as before, and strain this liquor through a clean

hair

hair sieve, place all your articles, as pepper, ginger, sassafras and sugar, in the reservoir with your washed herrings for three days, then proceed to barrel them, adding first one gallon of vinegar, then fill up the cask with your boiled liquor, and the pickle prepared from the spices; proceeding as above mentioned.

N.B. Sprats may be cured by the above process, with the addition of 2lb. of saltpetre pulverized for each cask of 32 gallons, it is immaterial whether they are cured with or without the heads and bowels.

*** Mr. Stiles's process for curing herrings will be found rather more expensive than the Dutch method of cure, but the herrings cured by Mr. Stiles have a peculiar mellowness and fine flavor, much resembling the anchovy, and may be employed in many cases as a valuable substitute for anchovies.

The SILVER MEDAL *of the Society was this Session voted to Mr.* PHILLIPS LONDON, *of Cannon-street, for Curing or Pickling Mackarel. The following Communication on the subject was received from him.*

SIR,

I TAKE the liberty of sending to you, for the inspection of the Society of Arts, &c. what I think a fine specimen of pickled mackarel in their entire state.

They

They were cured with my British solid salt. I am told the cure of mackarel whole has hitherto been deemed almost impracticable.

I believe split mackarel have been salted and preserved, but in a very inferior state to these. If my mackarel should be thought deserving of future notice, I shall with great pleasure communicate with the Society upon the subject.

I am, Sir,

Your obedient Servant,

PHILLIPS LONDON.

No. 57, *Cannon-street, April* 20*th*, 1813.

To C. Taylor, M. D. Sec.

Certificates.

British Herring Fishing Company's Office, London. At a meeting of the Directors, held at the Company's office, March 23d, 1813, present Kinnaird Smith, Esq. in the Chair;

William Smith, Esq. M. P.
Nathaniel Brickwood, Esq.
John Capel, Esq.
J. C. Saunders, Esq.
Thomas Cresswell, Esq.

Resolved, that the Secretary be directed to deliver to Mr. Phillips London, patentee of the British solid salt, a certificate as under:

Mr. London having this day produced to the Directors of the British Herring Fishing Company, some mackarel, cured with his patent solid salt, they do, in justice to Mr. London,

London, volnntarily certify, and declare it to be their opinion, that the mackarel so cured far surpassed in goodness any the directors had before seen, both in point of colour and taste,

The natural outside appearance of the mackarel was preserved nearly as bright as when they are fresh, although they had been in pickle since the last mackarel season, and when cut, were in high perfection, being of a reddish colour, very moist, and excellent in flavor.

A very small portion likewise of the salt, in which it had been in pickle, was dissolved, so that the whole which was left, appeared fit for other uses.

The directors feel pleasure in testifying these facts, which if generally known, they hope may tend to the benefit of the community at large.

Signed by order of the Board,

THOMAS SAUNDERS, Secretary.

TO MR. PHILLIPS LONDON.

SIR,

As some fishermen have been lately with me from Margate, on the business of a ship to which they lent assistance, whilst on the Margate sand, I conversed with them on the subject of the approaching mackarel fishery. They were astonished when I told them that you had completely cured that fish with the *solid salt*, and their surprize was increased when I gave them a specimen of those which you caused to be cured in October last. They admired greatly the condition of the fish, and said, to use their own words, " that they had tried to cure them many a time and often, but never could succeed." They have taken

the fish to Margate with great satisfaction, and think that the consequences will be very important, as the take of mackarel on the British coast may be carried to an immense extent, and open a large foreign trade, as well as afford a wonderful supply for home consumption.

I have also shewed the cured mackarel to one of the first Jamaica merchants, who adjudged it to be a new discovery, and said that the fish were perfectly cured, and fit for the West India consumption.

The flavor of these cured mackarel appears to be as extraordinary as their preservation, being thought by some persons for use as sandwiches, and the purposes of the table, equal, if not superior to the anchovy.

I am, dear Sir,

Yours, very respectfully,

R. T. MARTEN.

America Square, May 4th, 1813.

To MR. P. LONDON.

Mr. P. LONDON'S *Process for curing Mackarel.*

THE salt which he uses for his pickle, is British salt refined by fusion, in which operation the impurities are separated by precipitation.

The strength of the brine in which his fish is pickled is in specific gravity in proportion to water, as 1205, to 1000.

He recommends the following plan for the cure.

The fishing boats to take out with them, vessels containing brine of the strength above mentioned, and the moment

moment the mackarel are caught they are to be put alive into this brine, without gutting or any other preparation.

That on barrelling them, a surplus of dry salt be added in the cask, to strengthen the brine, which is become weaker from a portion of the salt of the brine being absorbed by the fish and the natural moisture of it.

That this is all the necessary operation, that the expense of the salt is very little, as government allows a drawback of the duty on all salt used in the fisheries.

Mr. London believes that mackarel pickled in common salt would soon putrify. He supposes they may be preserved with large grained Cheshire salt, but even this is not equal to the refined salt he uses, which, from his experiments, contains 570 parts of marine acid, 425 parts of soda, and only 5 parts of extraneous matter, in 1000 parts of the salt.

*** It appeared to the Committee, that a greater portion of salt in lumps was added to the pickle, than could be dissolved, and that there always should remain a quantity of lumps of salt undissolved, ready to counteract by solution any tendency to putridity which may arise in the fish. That Mr. London's British salt is particularly well calculated for the preservation of fish, from being deprived of its impurities and water of crystallization by previous fusion.

The SILVER MEDAL *of the Society was this Session voted to Mr.* DURAND, *of Niagara, Upper Canada, for a Machine for braking, hackling, and scutching Hemp. The following Communication was received from him, an explanatory Engraving is annexed, and a Model of the Machine is preserved in the Society's Repository.*

MR. DURAND presents his compliments to Dr. Taylor, and has annexed a description of his hemp and flax machinery, which he hopes will be found intelligible.

Mr. Durand leaves town to-morrow, on his way to New York, and if Dr. Taylor should have any communication to make, he is desired to address it to Mr. Durand, Niagara, Upper Canada.

No. 11, *Old North-street, Red-lion-square,*
March 21*st*, 1810.

Mr. DURAND'S *Directions for his Hemp and Flax Machinery.*

THE horizontal wheel, 12 feet diameter, the shaft 10 feet long. Upon the top of the rim of the said wheel, should be 24 cogs or pins about 1½ inch thick, at equal distances round the circle, which act upon the levers that raise the brakes. From these levers are extended small bars fastened to a roller near the center of the brakes, which brakes should be made of plank, 1 foot wide, and 2 inches thick. The planks which form the under part of the brakes, are three feet long, and are fastened to a piece

of

of timber at the bottom 8 feet long, 18 inches wide, and 8 inches thick.

The jaws of the brakes rise 45 degrees, so as to form a right angle. From each of these planks are framed (across) the blades or beaters which intersect each other, and brake the flax or hemp. The lower end of the upper part of the brake plays on a pin running through the timber, and on this timber is fastened a spring with the upper end bearing upon a roller which passes through the side plank of the upper jaw, in order to force the brake down. This spring is so fixed as to be strengthened or weakened at pleasure by a key. There should be two brakes, one on each side of the wheel, which if the machinery is worked by a horse wheel, should be placed two feet above the level of the horses' feet.

The scutching part is a wheel, two feet long, and 3½ feet diameter, in the rim of which is placed 6 blades, which serve as wooden knives against a moving rack to clean the hemp or flax. This wheel should be vertical, and the knives horizontal. Upon the axis of this wheel at the end is a groove or pully, 8 inches diameter, and a band running about it, also around a band wheel under the large wheel, formed by hooked pins, extending downwards from the arms of the large wheel.

Reference to the Engraving of Mr. DURAND'S *Machine for Braking and Scutching Hemp or Flax. Plate* 17, *figs.* 1, 2.

The operation of dressing hemp or flax, to separate them from the woody stalk of the plant into distinct fibres, which

will admit of being spun into ropes or thread, is generally performed by means of the brake and scutcher, which are worked by hand.—The hand brake is a machine which was for many ages chiefly employed in braking and separating the *boon* from the flax, which is the cuticle or bark of the plant; it is a plank supported on legs like a stool, and another placed upon it, being united to the former at one end by a center pin, and the other having two teeth called swords, fixed upon it across its breadth, which interlock in the space between three similar teeth fixed across the lower plank ;—In using this machine the flax being held in the left hand across the three under teeth or swords of the brake, the upper teeth or swords are then with the right hand quickly and often forced down upon the flax, which is artfully shifted and turned with the left hand, in order that it may be fully and completely broken in its whole length ;—The flax stock and scutcher are implements for braking, cleaning and scutching flax, in the old method of dressing it. The stock is a plank fixed like a bench before the workman, and the scutcher is a kind of short wooden sword, with which he strikes the flax, while it is hanging over the edge of the stock. In this business the workman, with his left hand, holds the flax over the stock, while with his right hand he strikes the flax with the scutcher, with a sloping stroke.

This method of braking and scutching flax by hand being extremely tedious and laborious, the mill was invented in Scotland many years ago, but has been lately much improved, and by being driven by water makes great dispatch, and in skilfull and careful hands generally gives satisfaction. It has been generally constructed so as to break the boon by three indented rollers, placed one above the other, the middle one of which being forced quickly

quickly round, takes the other two along with it, and one end of the handfulls of the flax being by the workmen directed in between the upper and middle rollers, a curved board or plate of tin behind the rollers directs the flax to turn in again between the middle and undermost rollers; and thus the operation is repeated until the boon be sufficiently broken; great weights of timber and stone placed at the ends of levers are also employed to press the upper and under rollers towards the middle one.

The business of scutching is carried on by the mill, in the following manner, four arms something like the hand scutchers, before described, project from a perpendicular axle; a box placed around the axle incloses these projecting scutchers. and this box is divided among the workmen, each having sufficient room to stand and handle his flax; slits are made in the upper part and sides of the box, and through them they hold the flax against the stroke of the scutchers, which moving round horizontally strike the flax across, at right angles, and so thrash out, or clear it of the boon.

The braking of the flax by rollers is scarcely subject to any objection, except that it is dangerous to workmen not sufficiently on their guard, who sometimes allow the rollers to take hold of their fingers, and thereby endanger their whole arm, being instantly drawn in; in this way many have lost their arms, to avoid this danger a brake, upon the general principles of the hand brake before described, has been lately adapted to water machinery, and used in place of rollers with great advantage.

The horizontal stroke of the scutcher was long thought too severe, and wasteful of the flax; but very careful experiments have discovered, that the waste complained of must be charged to the unskilfulness or negligence

of the workmen; as, in good hands the mill carries away nothing but what, if not so scutched off, must be taken off in the hackling with more loss, both of time and flax; but to obviate the objection of the violence of the horizontal scutchers, an imitation of hand scutching has been applied to water. The scutchers there project from an horizontal axle, and move like the arms of a check-reel, striking the flax neither across nor perpendicularly down, but sloping in upon the parcel exactly as the flax is struck by the hand scutcher, this sloping stroke is obtained by raising the scutching stock some inches higher than the center of the axle, and by raising or lowering the stock over which the flax is held, or by screwing it nearer to, or farther from the scutcher, the workmen can temper or humour the stroke almost as he pleases.

Upon the latter principle, Mr. Durand's machine is constructed in combination with brakes, like the hand brake, but worked by machinery; the whole is made in an œconomical manner chiefly of wood, so as to be fit for the country use in Canada, where the culture of hemp is attended with very great advantage.

Fig. 1, Plate 17, is a perspective view of the whole machine: and fig. 2 is an elevation of one of the brakes, separately, and on a larger scale.

The machine may be worked either by the power of horses, or by a water-wheel; in the former case, the levers by which the horses draw, may be fixed to the vertical shaft A, and they will walk round beneath the wheel B; but in situations where a fall of water can be obtained, its power is applied in the manner represented in the Plate 17. The water-wheel is supposed to be placed behind the wall C C, and its axis comes through an aperture in it having

ing the crown-wheel D fixed upon it, the teeth of this act upon a trundle, fixed upon the vertical axis A, and thus gives it motion; the wheel B has pins or cogs fixed upon it, which act upon the short levers, *a*, *b*, and these by means of rods *d d*, communicate motion to the two brakes F and G; these are upon the same construction as the hand brakes before mentioned, though rather differing in their position; a thick plank of wood *c* is fixed down upon the floor, and at one end the two pieces *l l*, are erected in an inclined position, and support the two fixed swords or teeth *e*, as shewn in fig. 2; *f* are the moving teeth fixed to two pieces *g h*, which are attached to the plank by a center pin through the end *h*; a pin is extended across between these two, and passes through the end of the rod *d d*, and another similar pin is extended between them, rather nearer the center; upon this the spring *i* operates to throw down the upper teeth of the brake upon the lower: when the ends of the levers at *a* and *b* escape from the cogs of the wheel B in its revolution, the flax being held between the teeth, is by repeated blows broken in the manner before described; the succeeding cog of the wheel B, raising up the brake again as soon as it has fallen, by one cog passing by; as the two sides of the wheel B move in opposite direction, the levers *a* and *b* are differently constructed, the cutter operating on opposite sides of the center of motion; thus the cog of the wheel acts upon one end, and the rod *d* is jointed to the other. The lever *a* has the rod *d* connected to it very near the same point, as that where the cogs of the wheel meet it. The scutchers are marked H and L, they are framed of four arms, projecting from an horizontal axis, mounted on pivots which are supported by vertical standards, as plainly shewn: the ends of these arms carry pieces

of

of wood which are properly shaped for scutching the flax over the edge of a stock, fixed near them for that purpose, and adjustable as before described; the two scutchers H and I, revolve in opposite directions to each other, and their stocks are therefore placed on opposite sides; that which supports the flax which is to be operated upon by the scutcher, I, being placed before it in front; but the stock for the other H is behind; by this means the two workmen do not interfere with each other; these opposite motions of the scutchers are given by two endless bands from a drum or cylinder K, situated over them, one of these bands is crossed and the other not, therefore they communicate opposite motions to the two scutchers, the cylinder is put in motion by means of an endless band *h*, running in a deep groove in it, which crosses, and is then carried round a circle of cleats or riggers, with angular notches in them, to receive the band fixed to the wheel B beneath it; thus by the same motion of the mill the two stocks and two scutchers are both actuated, and by the simplest machinery.

Mr. Durand's Machine for Braking and Scutching Hemp or Flax.

Fig. 1.

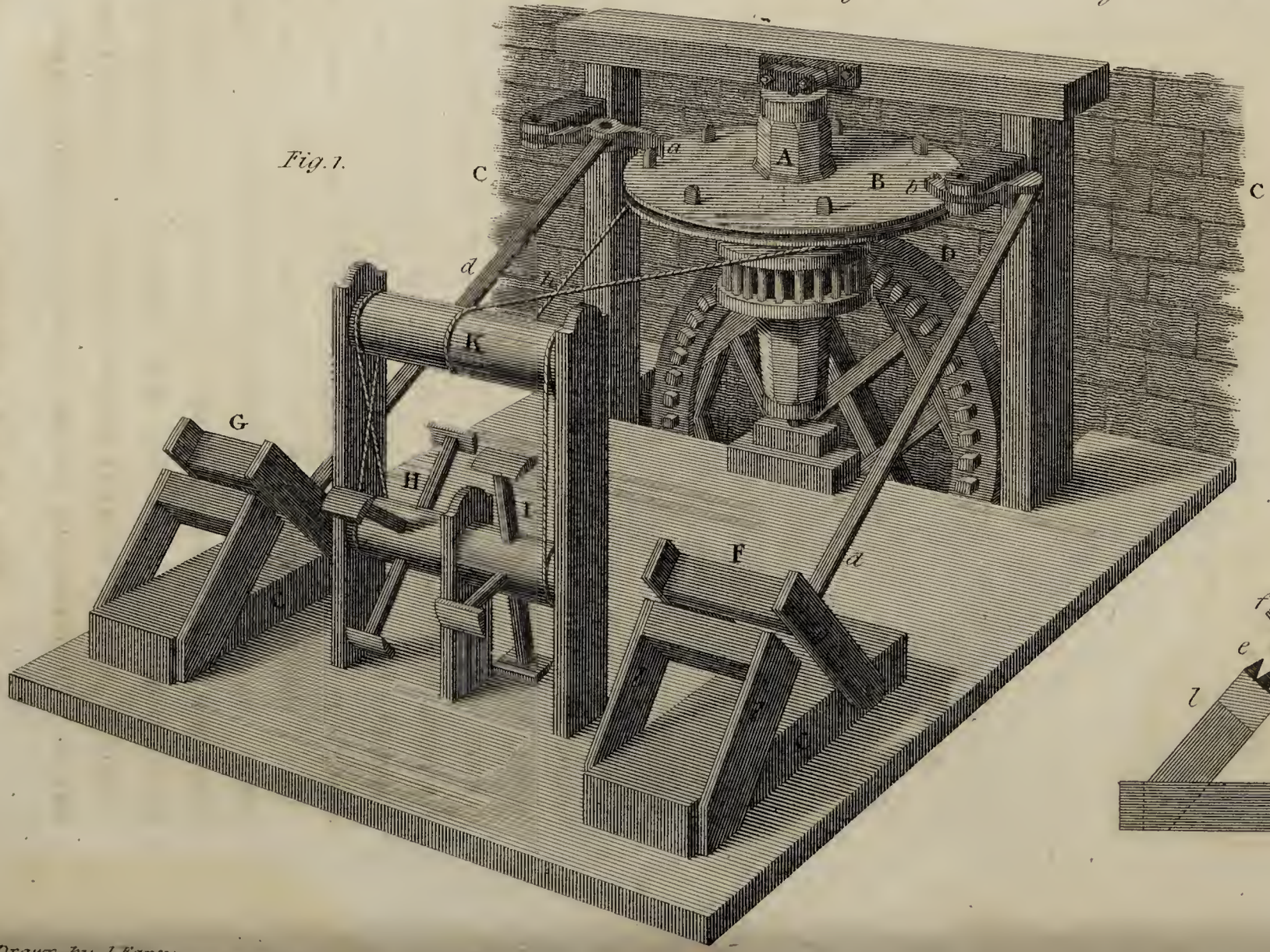
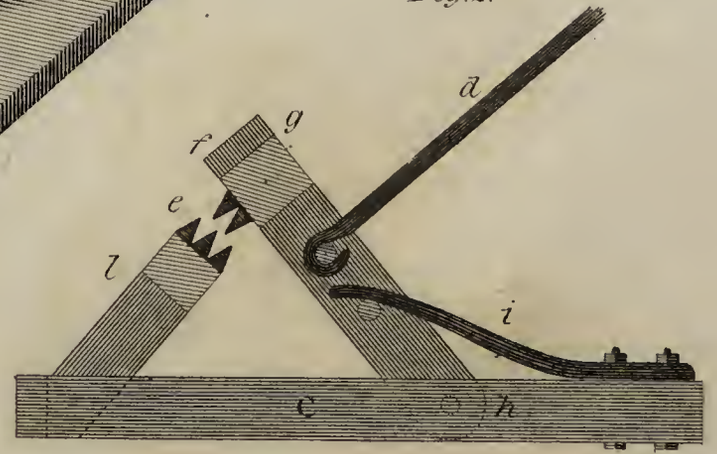


Fig. 2.



Drawn by J. Farey

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A CA-

A CATALOGUE

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Received since the publication of the Thirtieth Volume of the Society's Transactions, with the Numbers as they are arranged in the Classes to which they belong.

AGRICULTURE. CLASS I.

CXXI. A MODEL of a Machine for separating the Farina from Potatoes, from Mr. John Whately. See page 48.

CXXII. Two Implements for cutting out Potatoe Sets, from Mr. Richard Green. See page 71.

CHEMISTRY. CLASS II.

XXVI. A Hydro-pneumatic Blow Pipe, from Mr. J. Tilley. See page 107.

MANUFACTURES. CLASS III.

LVIII. A Model of a Tailor's Shop Board, from Mr. Samuel Barralet. See page 147.

LIX. A Model of a Stove for an economical Mode of burning Shavings, from Mr. J. Davis. See page 155.

Mechanics. Class IV.

CCCXXIII. A Model of a temporary Ship's Rudder, by Captain John Peat. See page 161.

CCCXXIV. A Ship's Binnacle, by Mr. G. Preston. See page 188.

CCCXXV. A Model of an Elevator, by Mr. Thos. Roberts. See page 195.

CCCXXVI. A Model of a Machine for pointing Needles, by Mr. George Prior, Jun. See page 206.

CCCXXVII. A Machine for firing cannon, by Mr. N. Douglas. See page 211.

CCCXXVIII. An improved German Flute, by Mr. Malcolm M'Gregor. See page 215.

CCCXXIX A Model of a Gudgeon for a Water-wheel, by Mr. Robert Hughes. See page 221.

CCCXXX. A Model of a Guard for a Carriage Wheel, by Mr. John Padbury. See page 225.

CCCXXXI. An Apparatus for bleeding in place of Leeches, by Mr. J. Whitford. See page 229.

CCCXXXII. A Model of a Guide Post for public Roads, by Mr. James Swaine. See page 240.

CCCXXXIII. A Model of a Fire Escape Ladder, by Mr. A. Young, Jun. See page 244.

CCCXXXIV. A Centrical Guage, by Mr. H. R. Palmer. See page 247.

CCCXXXV. Expanding Centre Bits, by Mr. James Stone. See page 250.

Polite Arts. Class V.

XIX. An Instrument for drawing Ellipses, by Mr. John Farey, Jun. See page 117.

XX. A Method of preserving Oil Paintings, by Mr. C. Wilson. See page 142.

XXI A portable Painter's Easel, by Mr. F. Williams. See page 144.

Colonies and Trade. Class VI.

I. A Machine for braking and scutching Hemp, by Mr. Durand. See page 268.

A

CATALOGUE

OF

THE MACHINES, MODELS,

AND OTHER ARTICLES

IN THE REPOSITORY OF THE SOCIETY INSTITUTED FOR THE ENCOURAGEMENT OF ARTS, MANUFACTURES, AND COMMERCE,

JOHN-STREET, ADELPHI,

Which may be viewed any Day, Sundays and Wednesdays excepted, between the Hours of Ten and Two, by an Order from a Member.

N. B. The Date of the Year prior to 1783 refers to Two Folio Volumes of the Society's Models and Machines, with Descriptions, by A. M. Bailey, Registra, printed for B. White, Fleet-street, 1782; and subsequently to the Thirty-one Volumes, 8vo. of the Society's Transactions, which contain a full account of each Article; all or any of which Volumes may be had at the Society's House.

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Plough for Surface draining.
Model of a Plough for do.—Duke of Bridgewater. 1801.
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Drill

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English Rhubarb —Mr. Maud. 1808.
English Opium.—Mr. Baker. 1795.
Do. Do.—Mr. Jones. 1800.
White Lilly Root Powder.—Mr. Willis. 1804.
Vernal Squill Powder.—Mr. Willis. 1804.
English Verdegris.—Mr. Gee. 1786.
Do. Do. 1800.
Edulcorated Fish Oil.—Robert Dossie. 1761.
Fish Oil prepared for Painting.—Mr. Vanherman. 1805.
Oil of Sessamum Seed.—Samuel Bowen. 1775.
Do. of Sun Flower Seed.—Charles Barrow. 1775.
Do. of Earth Nutts.—Samuel Bowen. 1775.

Oil of Cotton Seed.—Mr. Beatson. 1796.
Do. of Adjowen.
Starch from Horse Chesnuts. 1795.
Starch from the Arum Maculatum.—Jane Gibbs. 1797.
Indigo.—Mr. Brown, Jamaica. 1762.
Do.—Mr. Strachey. 1775.
Do.—John Robley, Tobago. 1778.
Sample of Annatto, from Calcutta.—Dr. Roxburgh. 1811.
Specimen of Permanent Black Dye, from the East Indies.—Dr. Howison. 1804.
Native Blue.—Dublin Society. 1806.
Sample of Ochre.—Lord Riblesdale. 1806.
Ore of Zinc.—Lord Riblesdale. 1806.
British Rock Salt. 1806.
Spirit of Carrots. 1788.
Substitute for Peppermint Water.—Mr. Salisbury. 1810.
Aluvial Matter from Cero de Trio.—Mr. Maw. 1811.
Glass for Acromatic Telescopes. 1771.
Specimens of Scotch Granate.—A. Mitchel, Esq. 1810.
Do. of Marble.—Alexander Mitchel, Esq. 1810.
Do. of Marble from the Rohsclyn Quarry, Anglesea.—Rev. Robert Williams. 1810.
Volcanic Earth, from Barbadoes.—Chris. Wilson. 1812.
Sessamum Seed.—Samuel Bowen. 1775.
Adjowen Seeds.—Mr. Complin. 1797.

CLASS 3d.

MANUFACTURES.

Model of a Machine to Twist Rope or Cordage.—George Sylvester. 1790.
Machine for Spinning and Winding.—Mr. Webb. 1761.
Do. Do.—Robert Burt. 1793.
Double-handed Spinning Wheel.—Mr. Perrin. 1761.

Horizontal

Horizontal Spinning Wheel.—Mr. Harrison. 1764.
Improved Spinning Wheel.—John Antis. 1793.
Do. Do.—John Antis. 1795.
Model of a Machine to spin Cotton.—John Barton. 1788.
Wheel for Spinning the Silk from Cocoons.—Mrs. Jones. 1792.
Spindle and Whirl.—Miss Ives. 1789.
Machine for Winding Balls of Thread.—John Powell. 1779.
A Silk Reel.—Mr. Verrier. 1762.
Ditto.—Mr. Pownall. 1762.
Model of a Silk Reel.—Mr. Pullen. 1762.
Model of a Loom for Weaving Modes.—Sam. Sholl. 1789.
Model of an Improved Silk Loom.—Wm. Jordan. 1794.
Model of a Loom for Weaving Ribbands.—Thos. Clulow. 1800.
Model of a Loom for Weaving Round Work.—T. Clulow. 1802.
Model of a Loom to Work by Steam.—J. Austin. 1805.
Spotting Shuttles.—J. Austin. 1805.
Model of an Engine Loom for Weaving Satin Guard.—James Pickard. 1804.
Model of a Swivel Loom for Weaving Satin Guard.—James Birch. 1804.
Model of a Loom to Weave Fishing Nets.—J. Robertson. 1806.
Articles used in Warping.—Thomas Barker. 1803.
Model of a Drawboy for Weaving Figured Work.—Alexander Duff. 1807,
Do. Do.—John Sholl. 1810.
Earthen Types for Calico Printers.—J. Austin. 1805.
Cutter for Silk Shag Edgings.—Peter Tansley. 1808.
Model of a Machine for covering Wire with Silk.—Thomas Saddington. 1809.
Model of a Machine for Twitching Wool.—Hugh Hughes. 1789.
Machine for Cutting and Crooking Wires for Wool Cards.—J. Beard. 1805.
Model for Braking Hemp.—Wm. Bond. 1807.

Model of a Machine for Braking and Scutching Hemp.—Mr. Durand. 1813.

Model of a Machine for Hackling Hemp or Flax.—Matthew Murray. 1809.

Chinese Model for ginning Cotton.

Sample of fine Spinning in Wool.—Miss Ives. 1789.

Specimen of Woollen Rope and Sacking.—G. Whitworth. 1808.

Wool, Yarn, and Cloth, from Merino Sheep bred in England.—Mr. Sheppard. 1811.

Frame for Breeding Silk Worms.—Rev. George Swaine. 1789.

Silk from Worms bred in England.—Mrs. Williams. 1784.

Do. Do.—Miss Rhodes. 1786.

Do. Do.—Rev. Mr. Swaine. 1789.

Do. Do.—Mrs. Barlow. 1810.

Silk and Cocoons, from Worms bred in England.—Mr. Bertezen. 1790.

Sample of English Silk.—Spun by Mrs. Jones. 1791.

Specimens of Vegetable Silk and Cotton from Barbadoes. 1784.

Sample of Silk Grass. 1786.

Silk.—Dr. Anderson, of Madras. 1793.

Seeds and Silk of the Corchorus Olitorus.—R. Wissett, Esq. 1795.

Organzined Silk from the East Indies.—R. Wissett, Esq. 1796.

Cloth and Thread from the Mango-tree Silk Worm.—Dr. Roxburgh. 1809.

Cloth and Thread from the Palma Christi Silk Worm.—Dr. Roxburgh. 1809.

Silk of the Asclepias Gigantia.

Samples of the first Quilting in the Loom, for which the Society gave, in various Premiums, the Sum of 41*0l.* in the years 1762, 3, 4 and 5.

English Tapestry, Wove in the Loom.—Mr. Freestone. 1773.

Net Wove in the Loom.—Mr. Freestone. 1776.

Do. Do.—Mr. Boswell. 1796.

Sample of Fine Weaving.—Mr. Neven. 1806.

Point Lace made in England. 1763.
Lace made with Knitting Needles. 1764.
Cambric made in England.—Mrs. Yates. 1780.
Sample of English Damask.—Mr. Lockett. 1810.
English Leghorn Platt.—Mr. Corston. 1805.
Tartan Stocking.—J. Robertson. 1811.
Cotton dyed Turkey Red and Yellow. 1761.
Sample of a Manufacture to Preserve Fruit Trees from Blight.—Colonel Taylor. 1808.
Bag to press the juice out of the Casava Root.—J. Steele. 1786.
Sample of British Sail Cloth.—R. and G. Caymes. 1812.
Sample of Flax from China Hemp. 1780.
Articles Manufactured in England from China Hemp.—Mr. Hardwick. 1787.
Hemp of the Agave Vivipara.—Dr. Anderson. 1809.
Hemp from the Plantain Tree.—Mr. Duncan, Demarara. 1809.
Hemp from Bean Stalks.—Rev. Mr. Hall. 1809.
Various Samples of Hemp from Quebec. 1804-5-6.
Cloth made from the Plantain Tree.—Mr. Bayley. 1767.
Thread and Cloth made from Hop Stalks.—Mr. Lockett. 1791.
Sample of Gomneter Yarn from Amboyna.—Col. Tatham. 1802.
Sample of Aquatic Wool from St. Petersburgh. 1793.
Paper made from Nettles.—Mr. Graves. 1787.
Specimen of Cloth and Paper made from Nettles.—Edward Smith. 1811.
Paper from the Paut Plant.—Wm. Wilmot. 1801.
Do. made of Withen Bark.—Mr. Greaves. 1789.
Fibres of Common Broom.
Do. of Ragwort.

CLASS 4.

MECHANICS.

Model of a Machine for Grinding and Polishing Glass.—Mr. Burrows. 1767.

Model

Model of a New Constructed Arch.—Mr. Arrow. 1772.

Model of a Machine to obtain a Rotatory by an Alternate Motion.—K. Fitzgerald. 1768.

Do. Do.—Thomas Armstrong. 1790.

Iron Frame for an Umbrella,—Mr. M'Kenzie. 1776.

Gauging Rod.—Mr. Efford. 1767.

Model of a Counterbalance for Ropes in the Shaft of a Mine.—Wm. Featherstonhaugh. 1799.

Machine to show the number of Boxes of Coals raised from a Mine in a given time.—John Antis. 1803.

Model of a Machine to raise Coals or Ore.—Mr. Hullman. 1775.

Do. Do.—Thomas Arkwright. 1801.

Do. Do.—Gilbert Gilpin. 1807.

Model of a Machine for cutting Piles off under Water.—John Foulds. 1795.

Model of a Double Pile Driver.—Mr. Harvey. 1794.

Model of a Saw Mill.—James Stainsfield. 1766.

Model of a Crank of a Saw Mill.—John Foulds. 1780.

Model of a Machine for Sawing Marble.—Robert Fulton. 1794.

Curvilinear Saw.—John Trotter. 1806.

Breast Wimble, with universal Joint.—Mr. Delevitz. 1771.

Worm Auger.—Phineas Cook. 1771.

Plane to Cut Willows for Chip Hats.—Mr. Galloway. 1775.

Model of a Foot Lathe.—Jos. Ridley. 1797.

Spheres turned in a Lathe.—Thomas Cooke. 1799.

Model of a Machine for Boring Cones.—Cha. Williams. 1810.

Improved Expanding Centre-Bit.—James Stone. 1813.

An Improved Gauge for marking Centre Lines.—H. R. Palmer. 1813.

Nail or Bolt Drawer.—Wm. Rich. 1787.

Wrench for Screw Nuts.—Wm. Barlow. 1808.

Model of an Expanding Band Wheel.—Andrew Flint. 1805.

Model of a Method of securing Decayed Girders.—Ja. Woart. 1802.

Model of a Truss Girder to raise a roof when sunk in the middle.—James Woart. 1803.

Model of a Machine to measure Timber.—Jas. Broad. 1807.

Instrument to measure Timber.—Thomas Colley. 1794.

Improved Tram Plates.—Charles Le Caan. 1807.

Specimen of Draining and Closure Bricks.—J. Stephens. 1811.

Model of an Inclined Plane for Canals.—Edmond Leach. 1786.

Model of a Canal Lock.—Robert Salmon. 1805.

Model for raising Water.—Mr. Wirtz. 1768.

Hydraulic Machine.—Mr. Westgarth. 1769.

Model of Machinery to raise Water out of Deep Wells.—Geo. Butler. 1794.

Model of a Wind-Mill to Drain Land.—Mr. Collier. 1758.

Model of a Tide Mill.—Rev Mr. Gainsborough. 1761.

Model of a Water Wheel.—Mr. Besant. 1801.

Model of an Improved Axis for large Water Wheels.—Robert Hughes. 1813.

Model of a Machine for Cleansing Drains.—T. Walters. 1794.

Model of a Machine to drain a Pond without disturbing the Mud.—Colonel Dansey. 1790.

Model of a Machine for clearing Rivers from Weeds.—Chevalier De Betancourt. 1796.

Model of Machinery for constructing Pisé or Earth Walls.—Robert Salmon. 1809.

Model of a Mill to Grind Hard Substances.—Garnet Terry. 1801.

Model of a Machine to Grind Colours.—Jas. Rawlinson. 1804.

Model of a Mill for making Slate Pencils.—J. Brockbank. 1809.

Improved Gudgeon.—Stephen Kendrick. 1793.

Model of a Method of preventing Machinery taking Fire by Friction.—Colonel Chrichton. 1805.

Tachometer to ascertain the velocity of Machinery.—B. Donkin. 1810.

Model of a Calender.—Edward Bunting. 1797.

Do. Do.—John Jones. 1786.

Model of a Mangle.—George Gee. 1798.

Model of a Triple Bellows.

Model of a Machine to Fish-up Goods from the Bottom of the Sea.—Mr. Frazer. 1776.

A Beam Compass.

Tuscan Arch to prevent Children being over-laid.—Count Berchtold. 1789.

Ring to fit various Fingers.—J. D. Ross. 1803.

Self-regulating Tallow Lamp.—J. W. Boswell. 1806.

Vent-Screw for Beer Barrels.—George Gee. 1798.

Model of a Temporary Scaffold.—Joseph Davis. 1812.

Flush Chest Handle.—Edward Johnson. 1778.

Balance for Roasting.—Charles Gower. 1787.

Model of a Machine for cutting Meat or Roots.—T. Newton. 1809.

Chest or Door Lock.—T. Cornthwaite. 1780.

Do. Do.—T. Cornthwaite. 1783.

Do. Do.—T. Arkwright. 1800.

Mortice Lock with Improved Latch.—John Antis. 1805.

Drawback Lock.—Wm. Bullock. 1801.

Latch Lock.—Mr. Taylor. 1784.

Secret Escutcheon for Locks.—Mr. Marshall. 1784.

Improved Night Bolt.—John Antis.

Book-Case Bolt.—Peter Herbert. 1805.

Model of Rack Bolts for Folding Doors.—William Bullock. 1798.

Lever Lock Bolt for Folding Doors.—Wm. Bullock. 1800.

Model of a Door with Spiral Spring Hinge.—Mr. Delevitz. 1768.

Spiral Spring Hinge.—Mr. Delevitz. 1768.

Model of a Door with a falling Hinge.—Mr. Gascoigne. 1773.

Model

Model of an Air-tight Hinge.—Martin Furness. 1807.

Model shewing a Method of Raising Doors over Carpets.—John Harrison. 1780.

Do. Do.—F. Tad. 1808.

Door or Window Pannel, with Steel Wires passed through, to prevent House-breaking.—Joseph Davis. 1807.

Sash Pulley.—Mr. Flower. 1771.

Sash Fastener.—Colin M'Kenzie. 1790.

Model of a Machine to prevent Accidents to Painters and Glasiers.—Joseph Davis. 1806.

Model of a Window to prevent Accidents in Cleaning Windows.—George Marshall. 1810.

Machine for Sweeping Chimneys.—George Smart. 1805.

Model of a Machine to Sweep Chimneys.—Joseph Davis. 1807.

Metal Rope or Chain.—William Hancock. 1796.

Do. Do.—G. Gilpin. 1809.

Model of a Walking Wheel Crane with a Stop to prevent accidents.—Christopher Pinchbeck. 1767.

Model of a Wheel Crane with Stop to prevent Accidents—Mr. Bunce. 1781.

Do. Do —Jos. Dixon. 1793.

Hand Crane with three Powers.—John. Braithwaite. 1784.

Model of a Weighing Crane.—Abraham Andrews. 1791.

Safe Hand Crane.—John Bell. 1791.

Model of a Crane on an Inclined Plane.—James White. 1792.

Model of a Double Gibb Crane.—Richard Johnson. 1793.

Model of an Expanding Crane.—Robert Hall. 1794.

Model of a Crane with a Fly Wheel.—Mr. Wellman. 1795.

Model of a Cellar Crane.—Thomas Gent. 1801.

Model of a Crane.—Gilbert Gilpin. 1805.

Model of a Cross Bar Lever.—Mrs. Wyndham. 1796.

Iron Plug to raise Large Stones.—R. Richardson. 1808.

Model of a Jack for Raising Weights.—A. Staghold. 1771.

Do. Do.—Mr. Mocock. 1789.

Model of a Machine for loading and unloading Goods.—Geo. Davis. 1797.

Model of a Screw Press.—Wm. Bowler. 1803.

Model of Screws for Packing Presses.—George Gilpin. 1777.

Model of a Double Packing Press.—John Peek. 1797.

Model of a Printing Press.—Joseph Ridley. 1795.

Stereotype Plates.—A. Wilson. 1811.

Bookbinders Press.—James Hardie. 1806.

Model of a Machine for cutting the Edges of Books.—J. J. Hawkins. 1805.

Model of a Machine to split Skins.—B. Stott. 1806.

Instrument to Equalize the Width of Leather Straps.—L. Aubery. 1810.

Instrument to Equalize the Thickness of Leather Straps.—L. Aubery. 1810.

Model of a Machine fer separating Iron and Brass Filings.—J. D. Ross. 1810.

Screw File for Papers.—Richard White. 1809.

Instrument for Gauging the Cutters for Watch Wheels.—Rob. Hynham. 1799.

Sector and Depthning Tool for Watch Makers.—J. Ridley. 1788.

Watch Escapement.—S. Mendham. 1807.

Do. Do.—Matthew Hill. 1784.

Do. Do.—William Howells. 1792.

Do. Do.—Mr. Staples. 1809.

Do. Do.—John De Lafons. 1801.

Do. Do.—John Prior.—1798.

A Clock with a Crank Escapement.—Simon Goodrich. 1799.

Clock Escapement.—Edward Massey. 1803.

Do. Do.—George Prior. 1809.

The Striking part of an Eight-day Clock.—John Prior. 1803.

Do. Do.—Ed. Massey. 1803.

Do. Do.—John Prior. 1811.

The Striking Part of an Eight-day Clock.—Hen. Ward. 1805.
Remontoire Clock Escapement.—John Antis. 1805.
Remontoire Escapement.—George Prior. 1811.
Improved Escapement for Time-keepers.—J. Watkins. 1805.
Improved Repeating Watch.—J. M. Elliott. 1804.
Alarum for Pocket Watches.—John Prior. 1805.
Noctuary for a Watch.—G. Spark. 1810.
Method of Banking the Balance of a Time-keeper.—W. Hardy. 1804.
Method of equalizing the Long and Short Vibrations in Time-keepers.—Wm. Hardy. 1807.
Compensation Balance.—Wm. Hardy. 1805.
Compensation Pendulum.—Henry Ward. 1807.
Model of a Compensation Pendulum.—A. Reid. 1810.
Do. Do.—David Ritchie. 1812.
Index Balance for Weighing.—S. Clayss. 1771.
Machine for Weighing Gold Coin.—Mat. Hill. 1775.
Instrument to show the difference of Weights in various parts of Europe.—Mons. Hanin. 1790.
Mariners Compass.—W. Nairne.
Compass and Protracter.—Aaron Miller. 1767.
Instrument to take Heights and Distances.—R. Samuel. 1782.
Instrument to Measure Angles.—Mat. Hill. 1789.
Quadrant.—Mr. Hadley.
Quadrant of Altitude.—Gabriel Wright. 1784.
Instrument to be used instead of the Quadrant of Altitude.—George Maling. 1783.
Geometrical Quadrant.—Robert Salmon. 1805.
Do. Do.—Robert Salmon. 1811.
Compass for Land Surveying.—J. Hodgson. 1811.
Balance Level.—Richard Drew. 1807.
Reflecting Circle.—James Allan. 1811.
The Dividing Engine of the late Mr Hooke.—A. Reid. 1810.
Model of a Mathematical dividing Engine.—J. Allan. 1810.

Machine

Machine for reducing Plans, &c.—James Bayley. 1790.

Improved Parallel Ruler.—Mr. Boswell. 1807.

Improved Instrument for Drawing Ellipses.—John Farey, jun. 1813.

Engraved Slates, by the use of which Children may Learn to Read and Write without Pen, Ink, or Paper.—Thomas Warren. 1809.

Instrument to form the Hand to Write correctly.—Thomas Perry. 1812.

Instrument to work Addition of Numbers.—J. Goss. 1812.

Chinese Calculator.—William Annand. 1810.

An improved German Flute.—Malcolm M'Gregor. 1813.

Improved Rat Trap.—William Bowler. 1812.

Method of coating Iron Bars with Lead —Capt. Brodie. 1804.

Model of a Cone or Break-Water.—Capt. Brodie. 1804.

Model of the York East Indiaman, showing the method of Floating her to Deptford, after having been driven on shore at Margate.—Wm. Barnard. 1779.

Model of a Vessel to Steer itself when under Sail.—Col. Wemyss. 1791.

Floating Light to save Persons who fall Overboard in the Night. William Shipley. 1776.

Model of a Boat to break Ice on Navigable Canals.—Mr. Berche.

Model of a Boat to assist Persons on the Ice.—Count Berchtold. 1792.

Model of a Mortar, to throw a Rope to or from Shore in case of Shipwreck.—Lieutenant Bell. 1792.

Models of Articles to relieve Persons in Stranded Ships.—Capt. Manby. 1808.

Drag for Drowned Bodies.—Dr. Cogan. 1806.

Model of a Drag for Drowned Bodies.—John Miller. 1809.

Marine Spencer to Prevent Drowning.—Knight Spencer. 1806.

Air Jacket or Life Preserver to prevent Drowning.—F. C. Daniel. 1807.

Model of a Life Boat.—Henry Greathead. 1802.
Model of a safe Sailing Boat.—Christ. Wilson. 1807.
Model of a Machine to bore Augur-holes on Board a Ship.—William Bayley. 1760.
Model of a Mooring Block.—Samuel Henman. 1810.
Model of a Wedge for suspending Ships.—Mr. Sepping. 1804.
Model of an Anchor with Improved Hooks and Stock.—Capt. Ball. 1803.
Model of Iron Knees for Ships.—Wm. Roberts. 1808.
Model of a Method of securing the Beams of Ships without Wooden Knees.—George Williams. 1809.
Model of a Gun to Fire at the Tops of Enemies' Ships.—Capt. Bagnold. 1811.
Model of a Machine to Draw Bolts out of Ships.—Wm. Hill. 1792.
Do. Do.—Capt. Bolton. 1798.
Model for Driving Bolts into Ships.—R. Phillips. 1801.
Model of a Ship Stove.—Joseph Collier. 1807.
Model of an improved Binnacle and Lamp.—G. Preston. 1813.
Model of a Double Capstan.—John Doscher. 1775.
Model of a Capstern to prevent the Surging of the Messenger.—J. W. Boswell. 1807.
Model of a Method of repairing Masts when damaged.—Captain Pakenham. 1792.
Model of a Jury Mast.—Captain Bolton. 1808.
Do. Do.—Capt Bolton. 1809.
Model of a Substitute for a Rudder.—Capt. Pakenham. 1789.
Model of a Temporary Rudder.—Capt. J. Peat. 1813.
Model of a Day and Night Telegraph.—Joseph Davis. 1805.
Model of the Swedish Telegraph.—Sir A.N. Edelcrantz. 1808.
Model of a Crank for a Telegraph.—Wm. Ward. 1808.
Model of a Telegraph.—C. Le Hardy. 1808.
Do. Do.—Captain Maxwell. 1809.
Do. Do.—Captain Maxwell. 1811.

Disk

Disk for Telegraphic Signals.—Knight Spencer. 1809.
Model of Telegraphic Signals.—Captain Maxwell. 1809.
Model of a Gun Rammer.—Mr. Cook. 1787.
Gun and Harpoon.—Richard Gibson. 1775.
Model of a Gun for throwing Harpoons.—Ab. Staghold. 1775.
Do. Do.—Char. Moore. 1790.
Model of a Gun and Harpoon.—Lieut. Bell. 1793.
Model of a Harpoon.—Nath. Bayles. 1786.
Gun with Lock to prevent Accidents.—John Webb. 1802.
Pistol with Bolt to prevent Accidents.—E. Baker. 1810.
Improved Gun Lock.—George Dodd. 1804.
Hand Gun Lock.—Mr. Onion. 1797.
Instrument for Firing Cannon.—N. Douglas. 1813.
Model of a Ventilator.—Dr. Hale. 1768.
Model of a Stove for Ventilation.—Sir G. O. Paul. 1801.
Tube to convey Fresh Air into Hospitals, &c.—Wm. Shipley.
Model of a Sash Frame to ventilate Hospitals or Prisons.—Sir G. O. Paul. 1801.
Model of a Machine to prevent injury from the Dust in Pointing Needles.—George Prior. 1813.
Do. Do.—Thomas Wood. 1811.
Model of Improved Coach Springs.—Joseph Jacob. 1769.
Model of a Perch Bolt and Axletree.—Mr. Hall. 1777.
Coach Brace.—Mr. Grose. 1776.
Carved Iron Coach Guard.—John Hayward. 1784,
Model of a safe Lynch Pin.—J. Varty. 1809.
Model of a Carriage Wheel Guard.—John Padbury. 1813.
Model of a Waggon on Friction Wheels.
Model of a Waggon to turn in a short angle.—W. Bailey. 1772.
Model of a Timber Carriage.—John Lesant. 1788.
Model of a Cart with Locking Pole.—Thomas Colley. 1793.
Model of a Cart.—Thomas Knight. 1791.
Model of a Cart for Rail Roads.—Chas. Le Caan. 1805.

Model of a Drag, for a Two-Wheeled Cart.—Joseph Kneebone. 1795.

Model of a Cart with a Gripe to prevent accidents in going down Hill.—William Bowler. 1803.

Model of a method of raising a Loaded Cart when fallen.—Benjamin Smith. 1810.

Method of relieving a Horse when fallen.—J. Martin. 1812.

Model of a Machine to clear Roads from Mud.—Dr. Winterbottom.—1803.

Model of an improved Guide Post for Roads.—J. Swaine. 1813.

An improved Blow Pipe.—J. Tilley. 1813.

Model of a Fire Engine.—Mr. Ewer. 1786.

Model of a Fire Escape.—Mr. Martin.

Do. Do.—John Davis. 1810.

Do. Do.—A. Young, jun. 1813.

Model of an Elevator or Fire Escape.—T. Roberts. 1813.

Model of a safe and useful method of Burning Shavings in Work Shops.—Joseph Davis. 1813.

Machine for the use of Shoe-makers.—Thomas Holden. 1804.

Do. Do.—Thomas Parker. 1805.

Do. Do.—Andrew Stass. 1806.

Do. Do.—J. King. 1812.

Machine for Boot Closers.—A. Stass. 1807.

Last for Stretching Shoes.—W. Kelman. 7839.

Model of an improved Shop-Board for Tailors.—Sam. Barralet. 1813.

Machine to Teach Blind Persons the Rules of Arithmetic.—G. Granville. 1770.

Memorandum Book for Blind Persons.—Robert Bromley. 1788.

Characters for teaching Blind Persons Music.—G. James Cheese. 1787.

Instrument for teaching Blind Persons Music.—G. J. Cheese. 1787.

Machine

Machine by which Blind Persons can learn or teach Music.—Mat. Cooke. 1812.

Instruments for Persons who have lost their Hands.—John Morrison. 1810.

Eye Bath.—J. D. Ross. 1809.

Spring Crutch.—George Prisley. 1810.

Model of a Bedstead for the Sick and Lame.—Henry Earle. 1811.

Do Do.—John Higgins. 1811.

Cupping Instrument.—John Fuller. 1811.

Annular Saw which cuts beyond its Center.—T. Machell. 1812.

A Mechanical Substitute for Leeches.—J. Whitford. 1813.

CLASS 5th.

POLITE ARTS.

A drawing Case.

A portable Painter's Easel —Fred. Williams. 1813.

Fixable Mineral White. 1782.

Gum Mastick and Wax.—Miss Greenland. 1792.

Water Colours in Cakes.—Mess. Reeves. 1784.

British Indian Iuk.—Mess. Reeves. 1784.

Oil Colours in Cakes.—Mr. Blackman. 1794.

Chalks—S. Grandi. 1806.

Samples of Colours.—S. Grandi. 1806.

Fixed Crayons.—S. Grandi. 1806.

Linseed Oil refined by S. Grandi. 1806.

Samples of Pannels prepared for Artists, by S. Grandi. 1806.

Concentrated Ox Gall, for the Use of Artists.—R. Cathery. 1810.

Sample of refined or colourless Ox Gall, for the Use of Artists.—Peltro William Tomkins. 1813

Specimens of Tracing Paper.—R. Cathery. 1812.

Sample of a Method of Preserving Oil-paintings from Decay.—Charles Wilson. 1813.

Medals—Presented by the Viceroy of Mexico. 1811.
Specimens of the Medals and Pallets given by the Society as Honorary Rewards.

CLASS 6th.

COLONIES AND TRADE.

Mattapany Tea.—Dr. Brooke, Maryland. 1760.
Rough Native Fossil Alkali.—East Indies. 1786.
Refined Native Fossil Alkali.—East Indies. 1786.
Caroba from Muscatt.—Dr. Anderson.
Gum Bable.—1790.
Cashoo Gum.—Dr. Titford. 1790.
Gum of the Bursera.—Dr. Dancer. 1790.
Gum Kutera.—M'Cowie. 1803.
Gum from—Dr. Anderson. 1806.
Dammer or Saul Resin.—Dr. Roxburgh. 1809.
Resin of a Tree called Boswellia Serrat.—Dr. Roxburgh. 1809.
Resin of Valeria Indica,—Dr. Roxburgh. 1609.
Cloves from Cayenne.—Henry Tolcher, Esq. 1793.
Do. from the Island of Dominica. 1798.
Cloves.—Dr. Anderson. 1800.
Do.—Dr. Anderson, St. Vincent. 1806.
Do.—Dr. Anderson St. Vincent. 1808.
Cinnamon Leaves.—Dr. Dancer, Jamaica. 1790.
Do. Do.—Dr. Anderson, Madras. 1793.
Root of a Cinnamon Tree.—Dr. Dancer, Jamaica. 1791.
Cinnamon.—Dr. Dancer. 1790.
Do.—Dr. Dancer, Jamaica. 1791.
Do.—Dr. Anderson, St. Vincent. 1802.
Do.—Mrs. Anstie, Madras. 1793.
Spirituous Distilled Water from Cinnamon Leaves.—Dr. Dancer. 1791.
Simple Distilled Water from Cinnamon Leaves.—Dr. Dancer. 1791.

Cinnamon Branches.—Mrs. Anstie, Madras. 1793.

Do.—Dr. Anderson, Madras. 1793.

Leaves and Seeds of the Cinnamon Tree.—Mrs. Anstie, Madras. 1793.

Cassia and Cinnamon.—General Melville. 1798.

Maple Sugar.—Dr. La Terrier, 1808.

Quebec or Canada Sugar from the Cotton Plant.—Wm. Von. denvelden. 1805.

Seeds of the Cotton Plant of Quebec.—W. Vondenvelden. 1805.

Seeds, &c. of the Dawn Tree.—Dr. Dancer. 1791.

Sample of Myrobolan Galls.—Dr. Roxburgh. 1805.

Sample of Black Myrobolan Galls.—Dr. Roxburgh. 1809.

Black Pepper.—Dr. Anderson. 1809.

East India Fever Bark.—Dr. Roxburgh. 1806.

Substitute for Sago.—Dr. Anderson. 1811.

Sweet Smelling Rush.—D. La Terrier, Madras. 1808.

Sample of the Papirus, from the River Arrappus near Syracuse.—Captain Maxwell. 1811.

Preserved Bread Fruit.—John Robley. Tobago. 1802.

Dried Bread Fruit Leaves and Seed.—J. Robley, Tobago. 1802.

A

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E

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INDEX.

A

Page

ACID, SULPHURIC, FROM SULPHUR, WITHOUT THE USE OF ANY NITRIC SALT, premium offered to the person who shall prepare the largest quantity of 11

ACORNS, premium offered for planting 4

ADVERTISEMENT, general 2

on Analytical Index of the first twenty-five volumes of the Transactions of the Society 24

on catalogue of books 24

on the thirtieth volume of do. 24

AGRICULTURE, notice to candidates in the class of 4

premiums offered in 4 to 9

bestowed in 22

papers in 25 to 80

ANNATTO, premium offered for the importation of 20

ARCHITECTURAL DESIGNS, premiums offered for the design of a Church 13

ASH, premiums offered for having sown or set the greatest quantity of 4

B

BACKHOUSE, Jonathan, Jun. Esq. the silver medal to, for planting larches 22

his communications on the subject 70 to 74

Page

Backhouse, William, Esq. the gold medal to, for planting larches 22
his communications on the subject 67 to 70
Barralet, Mr. Samuel, the silver medal and ten guineas to, for an improved shop-board for tailors 24
his communications on the subject 147 to 154
Bauke, Master George, the silver pallet to, for a drawing 22
Beans, premium offered for cultivating 5
and Wheat, premium offering for dibbling and drilling 5
Bees-Wax and Honey, premiums offered for 6
Bhaugulpore Cotton, premium offered for the importation of the greatest quantity of 20
Black-Lead Pencils, premium offered for freeing from impurity 14
Blue Pigment from Iron, premium offered to the person who shall discover the best 11
Boring and Blasting Rocks, premium offered to the person who shall discover a simple, safe, and cheap method of 17
Brewster, Mr. John, the lesser silver medal to, for an outline drawing 23
Bronzes, premium offered for the best drapery figure or group cast in bronze 13
Buck Wheat, premiums offered for cultivating the greatest quantity of land with 6

C

Carver, Mr. John, the lesser silver Medal to, for an outline drawing 23
Cat-Gut equal to the Roman or Italian, premiums offered for the best method of manufacturing 16

Page

CATTLE, premium offered for the best experiment on stall-feeding 9

CHALON, Miss Maria Ann, the silver pallet to, for a drawing 23

CHEMISTRY, premiums offered in 9, 10, 11, 12
bestowed in 22
papers in 81 to 115

CHESNUTS, premiums offered for having sown or set the greatest quantity of 3

CHINTZ PATTERNS FOR CALICO PRINTERS, premiums offered for the best 16

CLOTH FROM HOP STALKS, NETTLES, &c. premium offered for the productions of 15

COBALT, ZAFFRE, AND SMALT, premium offered for the discovery of a mine in Great Britain of 12

COCHINEAL, premium offered for the importation of the greatest quantity of true 20

COLONIES AND TRADE, premiums offered in 18 to 20
papers in 253

COMPARATIVE CULTURE OF WHEAT, BROADCAST, DRILLED, AND DIBBLED, premium offered for 5

CONDITIONS, general 20 to 21
in polite arts 14

COPPER-PLATE PATTERNS FOR CALICO-PRINTERS, premium offered for the best 16

COSTER, Miss, the silver medal to, for an original drawing 22

COUSINS, Samuel, the silver pallet to, for a drawing 23

CULTURE OF HEMP, premiums offered for the 9

CURE OF THE ROT IN SHEEP 8
FOOT-ROT IN SHEEP 8, 9

D

Page

Davis, Mr. Joseph, the silver medal to, for a safe and œconomical mode of burning shavings in workshops 24
his communications on the subject 155 to 160
Destroying the Insect commonly called the Borer, premium for discovering the most effectual method of 19
the Fly on Hops, premium offered for ascertaining the most easy and efficacious method of 8
the Grub of the Cockchaffer, premium offered for 8
worms, premium offered for an effectual method of 8
Destructive Effects from Moths, premium for discovering an effectual method of preventing the 11
Douglas, N. Esq. the silver medal to, for an instrument for firing cannon 24
his communications on the subject 211 to 215
Drawings by Engravers' Pupils, premium offered for the best finished 13
by Gentlemen, honorary premiums for 13
Historical, premiums offered for the best 13
by Nobility, honorary premiums for 13
in general, premiums offered for 13
of Landscapes, premium offered for the best 13
of the Hand and Foot, premium offered for 13
of Outlines 13
Pen, of a Head, premium offered for 13
Perspective of Machines, premium offered for the best 13
Drury, Mr. Charles, ten guineas to, for his improved paste from potatoes 22
his communications on the subject 113 to 115

Page

DURAND, Mr. the silver medal to, for a machine for hackling and scutching hemp 24
his communications on the subject 268 to 274

E

EDWARDS, Miss F. the silver pallet to, for a drawing 23
ELMS, premium offered for having planted the greatest quantity of English 4
premium offered for a substitute for water-pipes 17
ENGRAVERS, premiums offered for the pupils of 13
ENGRAVING, HISTORICAL, premiums offered for the best 14
LANDSCAPE, premiums offered for 14
MEDAL DIE, premiums offered for 14
ON WOOD BLOCKS, premium offered for 14
ETCHING OF LANDSCAPES, premiums offered for the best 14
AN HISTORICAL SUBJECT 14
A PORTRAIT 14
EXTINGUISHING FIRES, premium offered for the most effectual method of 17

F

FAMILY MILL, premium offered to the person who shall invent an easy and expeditious working 16
FAREY, Jun. Mr. John, the gold medal to, for an instrument for describing or drawing ellipses of various forms and sizes 23
his communications on the subject 117 to 130
FEMALES, premiums offered for the employment of 15
FINDEN, Mr. William, the gold medal to, for an engraving 23
FOREST TREES, premiums offered for planting 5

G

Page

Gaining Land from the Sea, premium offered for 7

Geddes, Miss Margaret, the lesser gold medal to for an original oil painting 22

Glazing Earthen-Ware without Lead, premium offered to the person who shall discover the cheapest method of 12

Gloves equal to French Kid, premium offered for making 16

Green, Mr. Richard, the Thanks of the Society to, for his present of two instruments for cutting or scooping out the eyes of potatoes, and his communication respecting the instruments 74 to 76

Gunpowder Mills, premium offered for an effectual method to prevent explosion in 16

H

Habershon, Mr. Matthew, the silver medallion to, for a design of a palace 22

Harriott, William, Esq. the silver pallet to, for an original drawing 22

Harvesting Corn in Wet Weather, premium offered for the cheapest method of 7

Hay, Meadow, premium offered for making in wet weather 7

Hay, Miss Eliza, the silver pallet to, for an original landscape 23

Hayter, Miss Anne, the silver medal to for a drawing 22

Master John, the silver pallet to, for an outline 23

Heating Rooms for the purpose of Manufacturers, premium offered for the discovery of a superior method to any hitherto known of 17

Hemp, premium offered for the culture of, in the United Empire 9

Page

Hemp, Cultivation of, in Upper or Lower Canada, premium offered for 19
Cultivation of, in Lower Canada, premium offered for 19
Cultivation of, in Nova-Scotia and New Brunswick 19
Importation of, from Canada, Nova-Scotia, and New Brunswick, premium offered to the master of that vessel who shall bring to this country the greatest quantity of 19
Substitute for, premium offered for a 19
Herrings, premiums offered for curing, equal to the Dutch 18
Hesleden, Major Bryan, the gold medal to, for improving waste land 22
his communications on the subject 25 to 32
Hogs' Bristles, premium offered for the greatest quantity of, equal to those imported from Russia or Prussia 15
Hughes, Mr. G. the silver medal to, for a temporary scaffold 23
his communications on the subject 203 to 205
Hughes, Mr. Robert, the silver medal to for an improved axis for large water-wheels 24
his communications on the subject 221 to 225
Hurlstone, Master A. P. the silver pallet to, for a drawing 22
Master F. Y. the lesser silver medal to, for a drawing 22

I

Improving Land Lying Waste, premium offered for 7
Indelible Ink, premium offered for 10
Innes, Miss A. J. E. the lesser gold medal to, for an original drawing 22

Page

Iron, premium offered for preserving from rust 12
premium offered for fine bar 12

J

Jones, John Maurice, Esq. the lesser gold medal to, for planting timber trees 22
his communications on the subject 36 to 42

K

Kali for Barilla, premiums offered to the persons who shall have cultivated the greatest quantity of land for 18, 19
Knight, Mr. Edward, the gold medal to, for the growth of a crop of beans, and sowing wheat on the same land, the same year, and preventing the necessity of a fallow 22
his communications on the subject 76 to 78
ten guineas to, for twenty-one stocks of bees 22
his communications on the subject 79, 80
Knowlys, W. C. Esq. the lesser gold medal to, for improving waste land 22
his communications on the subject 33 to 36

L

Landscape Engraving, premium offered for the best finished 14
Landseer, Miss, the silver pallet to, for an original landscape 23
Master Edward, the silver pallet to, for a drawing 23
Master T. the lesser silver medal to, for an etching 23

Page

LARCH, premium offered for having planted the greatest number of larch trees 4

LEWIS, Mr. John, the gold medal to, for curing 6533 barrels of white herrings 24

his communications on the subject 253 to 258

LONDON, Phillips, Esq. the silver medal to, for curing or pickling mackarel 24

his communications on the subject 263 to 267

M

MAC GREGOR, Mr. Malcolm, the silver medal and twenty guineas to, for his improved German Flute 23

his communications on the subject 215 to 220

MACHINE FOR DIBBLING WHEAT, premium offered for 8

FOR RAISING COALS, ORE, &c. premium offered for 17

FOR RAISING WATER, premium offered for 17

FOR REAPING AND MOWING CORN, premium offered for 8

FOR THRASHING, premium offered for 8

MAKING MEADOW HAY IN WET WEATHER, premium offered for ascertaining the best mode of 7

MANUFACTURES, premium offered in 15, 16

bestowed in 23

papers in 147 to 160

MANUFACTURING TALLOW CANDLES WITH PROPERTIES RESEMBLING WAX, premium offered for 10

CANDLES FROM RESIN OR OTHER SUBSTANCES 10

MANURES 7, 8

MAP OF ENGLAND AND WALES, premium offered to the person who shall publish a mineralogical 12

Page

MAP OF IRELAND 13
OF SCOTLAND 13
MARBLES, premium offered to the person who shall discover, within Great Britain, a quarry of white statuary 11
MARINE PAINTING, premiums offered for the best performances of 13
MECHANICS, premiums offered in 16 to 18
bestowed in 23, 24
papers in 161 to 252
MEMBERS, elected since the last distribution 24
list of contributing 307 to 345
corresponding 345
to correct their address when erroneous 24
MODELS AND MACHINES, a list of those rewarded during the session 279 to 281
catalogue of, and other articles in the repository of the Society, with the dates of the time they were received 283 to 305
MORSE, Mr. S. F. B. the lesser gold medal to, for an original cast of the Dying Hercules 23
MOTHS, premium offered for discovering an effectual method of preventing the destructive effects from 11
MUSLIN, premium offered for rendering it less combustible 11

N

NATURAL HISTORY, premium offered to the person who shall publish the, of any county in the United Kingdom 12
NEWELL, Master Jabez, the lesser silver medal to, for a miniature drawing 23
NORWAY FIR SEEDLINGS, premium offered for planting 5

Page

NUTMEGS, premium offered for the greatest quantity of merchantable 18

O

OAKS, premium offered for ascertaining the best method of raising 4
OFFICERS OF THE SOCIETY, list of 3
OIL, premium offered for paintings in 13
offered for, from porpoises 18

P

PADBURY, Mr. John, the silver medal to for a carriage wheel guard 24
his communications on the subject 225 to 228
PAGE, Mr. William, the silver pallet to, for an outline drawing 23
PAIN, Mr. G. R. the silver medal to, for a design for a gothic palace 22
PAINT, premium offered for a white substance for the basis of 11
PALMER, Mr. H. R. the silver medal to for a guage 23
his communications on the subject 247 to 249
PAPER FROM RAW VEGETABLE SUBSTANCES, premium offered for the manufacture of 15, 16
TRANSPARENT, premium offered for the best method of making 16
PARSNIPS FOR CATTLE OR SHEEP, premium offered for the cultivation of land for growing 6
PEART, William, Esq. the silver medal to, for a drawing 22
PEAT, Captain John, the gold medal to, for his invention of a temporary rudder 23
his communications on the subject 161 to 186

PHILLIPPS,

Page

PHILLIPPS, Jun. Mr. Leonard, the lesser gold medal to, for his plantation of hardy fruit trees 22
his communications on the subject 64 to 67
PHILLIPPS, Miss Eliza, the silver medal to for a drawing 22
Miss Louisa Anne, the silver pallet to for an original landscape 22
PLASTER CAST, premium offered for the best 13
PLOUGH, premium offered for a paring 8
POLITE ARTS, conditions for 14
premiums offered in 13, 14
bestowed in 22, 23
papers in 117 to 146
PORDEN, Mr. Charles, the gold medallion to, for a design of a Palace 22
POTATOES, premiums for cultivating the greatest quantity of 7
premiums for preserving 7
PREFACE iii to xxi
PREMIUMS AND REWARDS BESTOWED 22, 23, 24
OFFERED FOR THE ADVANTAGE OF THE BRITISH COLONIES 18, 19, 20
OFFERED FOR THE ADVANTAGE OF THE BRITISH SETTLEMENTS IN THE EAST INDIES 20
OFFERED FOR THE ADVANTAGE OF THE COMMERCE OF THE UNITED EMPIRE 18
IN AGRICULTURE 4 to 9
IN CHEMISTRY, DYEING, AND MINERALOGY 10 to 12
IN COLONIES AND TRADE 18 to 20
IN MANUFACTURES 15, 16
IN MECHANICS 16 to 18
IN POLITE ARTS 13, 14
FOR DRAWINGS IN GENERAL 13
FOR THE BEST COPY 13
TO OBTAIN A LIST OF 24

Page

PREPARATION OF ANY ALKALINE OR EARTHEN NITRATE, premium offered to the person who shall discover a 12

OF A GREEN COLOUR FOR PRINTING COTTON CLOTH, premium offered for 11

OF A RED STAIN FOR COTTON CLOTH, premium offered for the best 10

PRESERVING IRON FROM RUST, premium offered to the person who shall discover the means of 12

CABBAGES, premium offered for 6

CARROTS, PARSNIPS, OR BEETS, premium offered for 6

SALTED PROVISIONS FROM BECOMING RANCID OR RUSTY, premium offered for the best and most efficacious method of 9

SEEDS OF VEGETABLES, premium offered for the best method of 10

TURNIPS, premium offered for 6

PRESENTS RECEIVED BY THE SOCIETY 275 to 277

PRESTON, Mr. Grant, the silver medal to, for a ship's binnacle and lamp 24

his communications on the subject 186 to 194

PREVENTING ACCIDENTS FROM HORSES FALLING WITH TWO-WHEELED CARRIAGES, premium offered for the best method of 17, 18

THE BLIGHT, OR RAVAGES OF INSECTS ON FRUIT TREES AND CULINARY PLANTS, premium offered for the most effectual method of 8

THE DRY ROT IN TIMBER, premium offered for the most effectual method of 9

THE ILL-EFFECTS OF FLIES ON SHEEP, premium offered for the best method of 9

THE PREJUDICIAL EFFECTS TO THE PERSONS EMPLOYED IN POINTING NEEDLES 19

Page

Prior, Jun. Mr. twenty-five guineas to, for his method of preventing the ill effects arising to workmen in grinding or pointing needles 23
his communications on the subject 206 to 211
Protecting Sheep, premium offered for the best method of 9
Pupils of Engravers, premium offered for the 13

R

Raising Grass Seeds, premium offered for 6
the Bodies of Persons who have sunk under Water, premium offered for the best portable drag for 18
Water for the Irrigation of Land, premium offered for 8
Red Pigment, premium offered for discovering 11
Refining Block Tin, premium offered to the person who shall discover the best means of 12
Copper from the Ore, premium offered to the person who shall discover the best means of 12
Whale or Seal Oil, premium offered for an effectual method of 9
Rivers, Mr. Charles, the lesser silver medal to, for an engraving 23
Roads, premium offered for discovering the most effectual and cheapest method of improving turnpike and other 18
Roberts, Mr. Thomas, the silver medal and twenty-five guineas to, for his elevator 23
his communications on the subject 195 to 203
Robertson, Master J. the lesser silver medal to, for a drawing 23

Page

Roffe, Master A. J. the silver pallet to 23
Ross, Master William, the silver pallet to, for a drawing 23
Russell, Mr. Charles, the silver medal to, for an outline drawing 23

S

Say, Miss Mary Ann, the silver pallet to, for a drawing 23
Scriven, Mr. Edward, the lesser gold medal to, for an engraving 23
Securing Plantations of Timber-Trees and Hedge Rows 5
Sheep, premiums offered for the best and most effectual method of curing the rot in 8
premium offered for the cure of the foot-rot in 8
premium offered for discovering a method of preventing the ill effects of flies on 9
premiums offered to the person who shall have sold the largest quantity of Merino wool 15
Silk, premiums offered to those who shall grow the greatest quantity of, in Malta 19, 20
Statuary Marble, premium offered for the discovery of a quarry, within Great Britain, of white 11
Steam, premium offered for the best method of increasing the force of 10
Steele, Miss Anne, the lesser silver medal to, for a drawing 22
Steuart, Patrick, Esq. the lesser gold medal to, for his plantations 22
his communications on the subject 43 to 45
Substitute for Tar, premium offered for the best 10
Sugar in a Solid Form from Treacle, premium offered for the best method of separating 10

Page

Sutherland, Miss Henrietta, the silver pallet to, for a drawing 22

Stephens, J. Esq. the lesser silver medal to, for a forcing pump 24

his communications on the subject 235 to 239

Stiles, Mr. Thomas, twenty guineas to, for his method of curing British white herrings 24

his communications on the subject 258 to 263

Stone, Mr. James, five guineas to, for an expanding centre-bit 24

his communications on the subject 250 to 252

Swaine, Mr. James, the lesser silver medal to, for improved guide-posts 24

his communications on the subject 240 to 243

T

Taking Porpoises, premium offered for 18

Whales by the Gun-Harpoon, premium offered for 16

Tallmach, Mr. William, the silver medal and twenty guineas to, for a bronze cast 23

his communications on the subject 141 to 142

Tan, premium offered for a preparation of 10

Tar, premium offered for the best substitute for 10

Taylor, Jun. William, Esq. the silver medal to, for producing on wood charred by fire on the surface, the effect of painting, by forming the lights with gouges 22

Tomkins, Peltro William, Esq. the lesser gold medal to, for refining ox gall so as to make it colourless 22

his communications on the subject 130 to 140

Miss M. E. the lesser silver medal to, for a drawing 22

Page

Turpentine from the Scotch Fir, or Pinus Sylvestris, premiums offered for the greatest quantity of 10
Transit Instrument, premium offered for a portable 16
Thanks of the Society, &c. to Mr. Green, for his present of two instruments for cutting or scooping out the eyes of potatoes 74
Tilley, Mr. J. fifteen guineas to, for an hydro-pneumatic blow-pipe 24
his communications on the subject 106 to 112

U

Ultramarine, premium offered for preparing an artificial 11

V

Valliamy, Mr. Lewis, the silver medal to, for a design for a Palace 22
Ventilation, premium offered for improved 17

W

Walking-Wheel, premium offered to the person who shall invent an improved 17
Walnut-Trees, premiums offered for planting 5
Ward, Master J. the lesser silver medal to, for a drawing 23
Warren, Miss Mary Ann, the silver pallet to, for a drawing 23
Whateley, John, Esq. the lesser gold medal to, for his invention of a machine for the speedy separation and manufacture of farina or flour from potatoes, and for various applications thereof to make sea-biscuits, bread, and pastry 23
his communications on the subject 46 to 64

Page

WHITE, Thomas, Esq. the lesser gold medal to, for the application of larch bark in tanning 22
his communications on the subject 81 to 105
WHITFORD, Mr. J. the lesser silver medal to, for a mechanical substitute for leeches in bleeding 24
his communications on the subject 220 to 235
WICKS FOR CANDLES OR LAMPS, premium offered for the manufacturing from hop-stalks, or vines 15
EXPERIMENTS TO ASCERTAIN THE PROPER THICKNESS OF, premium offered for 15
WILLIAMS, Mr. Frederic, five guineas to, for an improved painters' easel 21
his communication on the subject 144 to 146
WILSON, Mr. Charles, ten guineas to, for his method of preserving oil paintings from decay 23
his communications on the subject 142 to 144
WOODEN PIPES FOR WATER, premium offered to the person who shall discover a superior method of laying 17
WYATT, Mr. H. the silver pallet to, for a drawing 23
WYON, Mr. William, the gold medal to, for a medal die engraving 23

Y

YOUNG, Jun. Mr. A. the lesser silver medal and five guineas to, for a fire-escape ladder 24
his communications on the subject 244 to 247

Society for the Encouragement of Arts, Manufactures, and Commerce.

This Society in May last presented the sum of Ten Guineas to Mr. James Ogden, a servant to F. D. Astley, Esq. of Dukinfield Lodge, near Ashton, under Line, for his invention of an Instrument for PRUNING TREES. A Patent has notwithstanding been taken out in November last, by another person, for a similar Instrument, which the Patentee terms an AVERUNCATOR, entirely without the knowledge or consent of the original Inventor, and which Patent Instruments are now selling at Two Guineas each; whereas Mr. Ogden is willing to supply his for Twenty-five Shillings each. The Society, therefore, in order to prevent any imposition on the public, under the idea of a Patent having been obtained for the sole making and vending them, think it proper to state, that any person is at liberty to inspect Mr. OGDEN's PRUNING INSTRUMENT, and take a drawing or model thereof, for the purpose of making them, by applying to the proper Officer, at the Society's house, any day, Sundays and Wednesdays excepted, between the hours of ten and two. A print and description of Mr. OGDEN's PRUNING INSTRUMENT has been published in the 30th Volume of the Society's Transactions.

Published by Order of the Society,

CHARLES TAYLOR, M.D. Sec.

Adelphi, London, Feb. 1813.

*** The Housekeeper at the Society's house will give instructions where Mr. Ogden's Pruning Instruments may be purchased; also some other ingenious Implements of his invention.

An Appendix to the Catalogue of the Books in the Society's Library, and a List of the Machines, Models, and other Articles contained in the Repository, may be had gratis by the Members at the Society's House in the Adelphi.

Reference to the ENGRAVINGS, *and Directions to the* BOOKBINDER.

Place the Portrait of the late Earl of Dartmouth as Frontispiece, to face the Title-page.

The Plate, No. 1, of Mr. Whateley's Machine for grinding down the Pulp of Potatoes, to face page 46.

The Plate, No. 2, of Mr. Green's Potatoe Scoops, and Mr. G. Hughes's Moveable Scaffold, to face page 74.

The Plate, No. 3, of Mr. Tilley's Hydro-pneumatic Blow-pipe, and Mr. Whitford's Mechanical Substitute for Leeches, to face page 106.

The Plate, No. 4, of Mr. Farey's Instrument for describing Ellipses, to face page 118.

The Plate, No. 5, of Ellipses drawn by Mr. Farey's Elliptograph, to face page 126.

The Plate, No. 6, of Mr. Williams's Portable Easel, and of Mr. Young's Ladder Fire Escape, to face page 146.

The Plate, No. 7, of Mr. Barralet's Shop-board for Tailors, and Mr. Davis's Stove, to face page 158.

The Plate, No. 8, of Captain Peat's Temporary Rudder, to face page 168.

The Plate, No. 9, of Mr. Grant Preston's Ships' Binnacle, to face page 188.

The Plate, No. 10, of Mr. Roberts's Quadruple Elevator, to face page 196.

The Plate, No. 11, of Mr. Roberts's Elevator or Fire Escape, to face page 202.

The

The Plate, No. 12, of Mr. Prior's Machine to carry-off the Dust produced in pointing Needles, to face page 210.

The Plate, No. 13, of Mr. Douglas's Instrument for firing Cannon, and Mr. M'Gregor's German Flute, to face page 218.

The Plate, No. 14, of Mr. Hughes's Pivot for a Water Wheel, and Mr. Padbury's Guard for a Carriage-Wheel, to face page 226.

The Plate, No. 15, of Mr. Stephens's Forcing Pump, and Mr. Swaine's Hand post, to face page 238.

The Plate, No. 16, of Mr. Palmer's Guage for marking Centre Lines, and Mr. Stone's expanding Centre Bit, to face page 250.

The Plate, No. 17, of Mr. Durand's Machine for Braking and Scutching Hemp, to face page 274.

THE END.

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HONI SOIT QUI MAL Y PENSE